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USATECOM PROJECT NO 8-5-0-00-04  
SMALL ARMS WEAPONS SYSTEMS (SAWS)

USAIB PROJECT NO 3110

**SOURCE DATA  
SMALL ARMS  
WEAPONS SYSTEM  
STUDY**

FINAL REPORT OF SERVICE TEST  
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DECEMBER 1965

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DEPARTMENT OF THE ARMY  
UNITED STATES ARMY INFANTRY BOARD  
Fort Benning, Georgia

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(14) USAIB-3110

(6) SMALL ARMS WEAPONS SYSTEMS (SAWS) (U) (8)

(16) USATECOM ~~SECRET~~ 8-5-8400-04

(9) FINAL REPORT OF ~~SECRET~~ TEST

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(12) 597 p.

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## ABSTRACT

1. (U) Type of Test: Service Test.

2. (C) Nomenclature of Test Items:

Rifle, 7.62-mm, M14  
Rifle, 7.62-mm, M14E2  
Rifle, 5.56-mm, XM16E1  
Rifle, 5.56-mm, S-R  
Rifle, 5.56-mm, A-R  
Rifle, 5.56-mm, H-R  
Carbine, 5.56-mm, S-C  
Carbine/Submachine Gun, 5.56-mm, C-SMG  
Automatic Rifle, 5.56-mm, S-AR  
Automatic Rifle, 5.56-mm, C-AR  
Machine Gun, 7.62-mm, M60  
Machine Gun, 5.56-mm, Code S

3. (C) Test Activity Responsibilities: USAIB was responsible for planning, conducting, and reporting on service and service-type tests of individual, vehicular (other than combat vehicle), and ground-mounted, crew-served weapons; and support of tests conducted by USABRL and USAHEL as directed by USATECOM.

4. (FOUO) Purpose of Work: To measure performance of SAWS weapons against standards provided by USACDC.

5. (U) Test Location and Duration: Testing was conducted at Fort Benning, Georgia, from 6 July 1965 to 15 November 1965.

6. (C) Test Methods: Testing was conducted in such a manner as to permit a comparison of effectiveness between weapons.

7. (C) Summary:

a. Findings. There are no significant differences between the SAWS weapons except for reliability. The current standard weapons are the most reliable.

b. Conclusions. The M14, M14E2, and M60 are significantly more reliable than their counterpart SAWS weapons. The use of duplex ammunition significantly increases hit capability.

c. Recommendation. USAIB recommends that no consideration be given to adoption of new weapons systems until a significant improvement over the standard 7.62-mm systems can be achieved.

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## SECTION 1 -- GENERAL

### 1.1 (U) REFERENCES (U)

See Appendix I

### 1.2 (U) AUTHORITY (U)

Letter, AMSTE-BC, USATECOM, 1 February 1965, subject: "Small Arms Weapons Systems (SAWS) Program (with Change 1 dated 30 April 1965) (USATECOM Project Nos. 8-5-0400-01 thru 8-5-0400-07) (U)."

### 1.3 (FOUO) OBJECTIVES (U)

1.3.1 (FOUO) To measure weapons performance against standards provided by the US Army Combat Developments Command (USACDC).

1.3.2 (FOUO) To provide, through the US Army Ballistic Research Laboratories (USABRL), data resulting from tests for use in parametric design/operational effectiveness/cost analysis studies to be conducted by USACDC.

1.3.3 (FOUO) To develop sufficiently comprehensive data, as appropriate, to provide a basis for choice if type classification is desired.

### 1.4 (FOUO) RESPONSIBILITIES (U)

1.4.1 (FOUO) The US Army Development and Proof Services (USAD&PS) was responsible for:

a. Planning, conducting, and reporting of engineering and engineering-type tests to achieve the objectives stated above.

b. Support of tests and experiments conducted by USABRL and the US Army Human Engineering Laboratories (USAHEL) as directed by the US Army Test and Evaluation Command (USATECOM).

c. Coordination of shipment of materiel, including ammunition, from sources of supply to USATECOM test agencies and return.

d. Conducting safety and function-firing, and providing USATECOM with recommendations as to safety release as soon after receipt of materiel as practicable.

e. Submitting recommendations to USATECOM and to test agencies, as appropriate, as to ammunition lots and types to be used in this program.

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1.4.2 (FOUO) The US Army Infantry Board (USAIB) was responsible for:

a. Planning, conducting, and reporting on service and service-type tests of individual weapons and vehicular (other than combat vehicle) and ground-mounted, crew-served weapons.

b. Support of tests and experiments conducted by USABRL and USAHEL, as directed by USATECOM.

1.4.3 (FOUO) The US Army Armor Board (USAARMBD) was responsible for:

Planning, conducting, and reporting on service and service-type tests to determine handling, transportability, and suitability for use of individual weapons designed specifically for combat vehicle crew members.

1.4.4 (FOUO) The US Army Aviation Board (USAAVNBD) was responsible for:

Planning, conducting, and reporting on service and service-type tests to determine handling, transportability, and suitability for use of individual weapons designed specifically for use by aircraft crew members.

### 1.5 (U) DESCRIPTION OF MATERIEL (U)

1.5.1 (U) The candidate weapons furnished for this test include current standard and test weapons.

#### 1.5.1.1 (U) Standard Weapons (U)

1.5.1.1.1 (U) Rifle, 7.62-mm, M14 (M14). (Fig 1, App V.)

1.5.1.1.2 (U) Rifle, 5.56-mm, XM16E1 (XM16E1). (Fig 2, App V.)

1.5.1.1.3 (U) Rifle, 7.62-mm, M14E2 (M14E2). (Fig 3, App V.)

1.5.1.1.4 (U) Machine Gun, 7.62-mm, M60 (M60). When mounted on the bipod the M60 will be referred to as the M60-LMG, and when mounted on the tripod it will be referred to as the M60-MMG. (Fig 4, App V.)

1.5.1.2 (U) Test Weapons (U) (See Manufacturers' Code Sheet - last page of report. Removed from copies distributed outside DOD)

1.5.1.2.1 (U) Rifle, 5.56-mm Code S-R (S-R). (Fig 5, App V.)

The S-R is a gas-operated 5.56-mm rifle capable of firing semi-automatic or full automatic fire from the closed-bolt position, by means of a selector lever. The S-R has a plastic removable stock with rubber recoil pad and a plastic rear pistol grip. It contains a dual sight system with the front post sight adjustable for elevation and a rear, two-position, peep sight adjustable for windage. The rifle is fed from a 30-round capacity box-type magazine. A bayonet and adjustable snap-on bipod is provided for the rifle. The flash suppressor serves as a grenade launcher for launching rifle grenades. The rifle has a reported muzzle velocity of 3,250 feet per second. Its full automatic cyclic rate of fire is 700-800 rounds per minute.

1.5.1.2.2 (U) Rifle, 5.56mm, Code H-R (H-R). (Fig 6, App V.)

The H-R is a 5.56-mm delayed blow back-operated rifle, capable of firing semiautomatic or full automatic from the closed-bolt position by means of a firing selector lever. It contains a fixed front post sight and an adjustable rear 4-position sight, that includes an open and peep capability, and is adjustable for windage and elevation. A plastic stock and a plastic rear pistol grip are provided. The H-R is fed from a 20-round capacity box-type magazine. The full automatic cyclic rate of fire is 650-750 rounds per minute. The reported muzzle velocity is approximately 3,150 feet per second. A bayonet and a detachable bipod are provided.

1.5.1.2.3 (U) Rifle, 5.56-mm, Code A-R (A-R). (Fig 7, App V.)

The A-R is a gas-operated, 5.56-mm, air-cooled, magazine-fed rifle capable of firing semiautomatic or full automatic fire from a closed bolt position by means of a selector lever. A fiberglass front handguard is provided. The A-R contains a front post sight adjustable for elevation and a rear peep sight adjustable for windage. The receiver and other parts are of sheet steel stampings. A bayonet and snap-on bipod are provided. The rifle contains a plastic pistol grip and a butt stock which can be pivoted to the side and folded to shorten the overall length of the rifle. The rifle is fed from a 20-round box-type magazine. Full automatic cyclic rate of fire is 700-800 rounds per minute. The reported muzzle velocity is approximately 3,250 feet per second. The muzzle flash suppressor serves as a grenade launcher for launching rifle grenades.

1.5.1.2.4 (U) Carbine, 5.56-mm, Code S-C (S-C). (Fig 8, App V.)

The S-C is a 5.56-mm gas-operated carbine, identical to the S-R rifle except for the following:

- a. A 15.7-inch barrel is substituted to reduce weapon length.
- b. The butt stock is hinged and designed to fold to the side to reduce weapon length.
- c. It does not have a grenade launching capability as does the S-R.
- d. Its muzzle velocity is less than the S-R; however, the cyclic rate of fire is the same.

1.5.1.2.5 (U) Carbine/Submachine Gun, 5.56-mm, Code C-SMG (C-SMG). (Fig 9, App V.)

The C-SMG is a 5.56-mm, gas-operated carbine/submachine gun. It is identical to the standard XM16E1 rifle except for the following:

- a. A 10-inch barrel, with noise suppressor attached, is substituted.
- b. The front handguard is shorter than that on the XM16E1 rifle.
- c. The butt stock is shorter, and telescopes to reduce weapon length for underarm firing. The stock is extended, and locked in the extended position, for shoulder firing. It has no grenade launching capability.
- d. The C-SMG will not accept a bayonet.
- e. Its muzzle velocity is less than the XM16E1; however, the cyclic rate of fire is the same.

1.5.1.2.6 (U) Automatic Rifle, 5.56-mm, Code C-AR (C-AR). (Fig 3, App V.)

The C-AR is a 5.56-mm automatic rifle. It is identical to the XM16E1 rifle except for the following:

- a. The C-AR is fitted with a heavier barrel of the same length.
- b. The C-AR is equipped with a 30-round box-type magazine.
- c. The C-AR will accept either the M2 or XM3 bipod mount.

1.5.1.2.7 (U) Automatic Rifle, 5.56-mm, Code S-AR (S-AR). (Fig 3, App V.)

The S-AR is a 5.56-mm, gas-operated automatic rifle capable of firing only in the automatic mode. It fires from the open bolt position. It utilizes many of the same components as the S-R. Sights are offset to the left, the front post sight is adjustable for elevation, the rear sight is a peep type adjustable for windage and elevation for ranges out to 1,100 meters. The S-AR fires from a 30-round box-type magazine which is inserted from the top. Cyclic rate of fire is 700-800 rounds per minute. The reported muzzle velocity is 3,250 feet per second. A snap-on bipod is provided which is interchangeable with the S-R rifle and S-LMG. The S-AR is equipped with the same butt stock and pistol grip assembly as the S-R.

1.5.1.2.8 (U) Machine Gun, 5.56-mm, Code S-LMG (S-LMG). (Fig 10, App V.)

The S-LMG is a light machine gun identical to the S-AR except for the following:

- a. The offset sights of the S-AR are replaced with in-line sights, having the same construction and capability of the S-AR sight.
- b. The magazine adapter for the S-AR is replaced with a feed tray and cover, to permit firing belted 5.56-mm ammunition.
- c. Belted ammunition is packaged in 150-round capacity plastic bandoleers. The bandoleer is attached to the weapon utilizing a dovetailed bandoleer supporter.
- d. The same bipod used with the S-R and S-AR is also used with the S-LMG.

1.5.1.2.9 (U) Machine Gun, 5.56-mm, Code S-MMG (S-MMG). (Fig 10, App V.)

The S-MMG is a medium machine gun and is identical to the S-LMG except that it is mounted on a standard M122 tripod mount, with a mount adapter which uses the standard traversing and elevating mechanism. In addition to the 150-round bandoleer, an M2A1 ammunition box packed with 800 belted cartridges may be used with the S-MMG.

1.5.1.2.10 (U) The S-LMG and S-MMG are referred to collectively as the Code S machine guns.



#### 1.5.1.3 (U) Weapon Families (U)

Some of the candidate weapons have assemblies and sub-assemblies common to one or more other candidates. The S-R, S-C, S-AR, S-LMG, and S-MMG belong to a family, have common parts, assemblies, and sub-assemblies, and are referred to as the Code S weapons system; the same receiver and butt stock component is used in all configurations of this family. The C-SMG, C-AR, and XM16E1 rifle are of the same family and have the same receiver. The M14 and M14E2 are members of the current standard family of weapons that have common parts and assemblies.

#### 1.5.2 (U) Ammunition (U)

1.5.2.1 (U) The ammunition used with candidate weapons was as follows:

a. M14 and M14E2 rifles.

- (1) Cartridge, 7.62-mm, NATO, Ball, M80 (M80).
- (2) Cartridge, 7.62-mm, NATO, Tracer, M62 (M62).
- (3) Cartridge, 7.62-mm, NATO, Duplex, M198 (M198).

b. XM16E1 Rifle, S-C, S-R, A-R, H-R, S-AR, C-SMG, and C-AR.

- (1) Cartridge, 5.56-mm, Ball, M193 (M193).
- (2) Cartridge, 5.56-mm, Tracer, M196 (M196).

c. M60 Machine Gun.

- (1) Cartridge, 7.62-mm, NATO, Ball and Tracer, linked, 4-1.
- (2) Cartridge, 7.62-mm, NATO, Ball, M80, linked (M80 linked).
- (3) Cartridge, 7.62-mm, NATO, Duplex and Tracer, linked, 4-1.
- (4) Cartridge, 7.62-mm, NATO, Tracer, M62, linked (M62 linked).

d. S-LMG and S-MMG.

- (1) Cartridge, 5.56-mm, Ball, M193, linked (M193 linked).
- (2) Cartridge, 5.56-mm, Ball and Tracer, linked, 4-1.
- (3) Cartridge, 5.56-mm, Tracer, linked (M196 linked).

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1.5.2.2 (U) Lot numbers of ammunition used in testing were as follows:

- a. Cartridge, 7.62-mm, NATO, M80 - FA 5374, WRA 22386, LC 12532, \*LC 12036, \*LC 12047.
- b. Cartridge, 7.62-mm, NATO, M62 - LC 12266.
- c. Cartridge, 7.62-mm, NATO, M198 - RA 451, RA 452, FAP 762449.
- d. Cartridge, 5.56-mm, M193 - WCC 6089, RA 5101, RA 5100, RA 5072.
- e. Cartridge, 5.56-mm, M196 - RA 5119, RA 5019, RA 5018.
- f. Cartridge, 7.62-mm, NATO, M80 linked - LC 12308, LC 12016, LC 12022, LCL 12566, LC 12532.
- g. Cartridge, 7.62-mm, NATO, M80 and M62, 4-1 - WCC 86083, RAL 85027, LCL 104201.
- h. Cartridge, 7.62-mm, NATO, M62 linked - LC 12352.
- i. Cartridge, 7.62-mm, NATO, M198 linked - FAP 762-L448.
- j. Cartridge, 7.62-mm, NATO, M198 and M62, 4-1 - FAPL 452, FAPL 454, FAPL 462.
- k. Cartridge, 5.56-mm, M193 and M196, 4-1 - RA 51ss/RA 5023, RA 5123/5025.
- l. Cartridge, 5.56-mm, M193 linked - RA 5123, RA 5122, WCC 6089.
- m. Cartridge, 5.56-mm, M196 linked - RA 5019, RA 5023, RA 5024.
- \* Match ammunition.

## 1.6 (C) BACKGROUND (U)

1.6.1 (C) The adoption of the 5.56-mm M16/XM16E1 rifle for US Air Force use and limited US Army use has stimulated the interest of industry in developing other weapons in this caliber for military use. In 1963-64, the Advanced Research Projects Agency (ARPA), Department of Defense, directed, and coordinated with US Army and Marine Corps, tests of the Code-S Weapons System. US Army tests were limited to those necessary to determine the military potential of the system, while the US Marine Corps conducted service and troop tests. The results of the US Army tests indicated that the Code-S weapons were accurate and of good basic design, but that the machine guns appeared

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to be marginal in operating power and deficient in barrel life. From the final report of the US Marine Corps test, it appeared that the Marine Corps favored the Code-S system as a replacement for caliber .30 and 7.62-mm weapons currently in Marine Corps use.

1.6.2 (C) In November 1964, the US Army Materiel Command (USAMC) requested that USATECOM prepare plans for engineering and service test of the Code-S Weapons System. A USATECOM directive was issued, but planning was suspended in December 1964 when it became apparent that the Code-S system would be tested as a part of a larger, more comprehensive program.

1.6.3 (C) On 17 December 1964, the Chief of Staff of the Army directed a review and evaluation of Small Arms Weapons Systems (SAWS) either in being, or feasible for adoption within the time frame 1967-80. This evaluation includes the current standard system of small arms (M14, M14E2, M60, and XM16E1). The objective of this program is to develop data upon which to base a program for replenishment of stocks of small arms as the inventory drops below requirements, and/or replacement of current small arms with weapons of demonstrated superiority.

1.6.4 (C) A military potential test of the Code-S Weapon System under arctic winter conditions was completed in April 1965.

1.6.5 (U) SAWS testing at USAIB began on 6 July 1965 and was completed on 15 November 1965.

## 1.7 (C) FINDINGS (U)

### 1.7.1 (C) PREOPERATIONAL INSPECTION AND PHYSICAL CHARACTERISTICS (Sub-Test No 1) (U)

1.7.1.1 (C) All of the candidate weapons are suitable with respect to physical characteristics.

1.7.1.2 (C) Except for the sight systems (ref Sub-Test No 4, Sights), there is no significant difference in simplicity of design and construction of the candidate weapons.

1.7.1.3 (C) The candidate weapons had the following number of shortcomings:

C-SMG - 1

S-AR - 1

### 1.7.2 (C) TRAINING (Sub-Test No 2) (U)

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1.7.2.1 (C) The firing positions and techniques of fire described in appropriate FM's and USAIS special texts are suitable and comparable for all candidate weapons.

1.7.2.2 (C) With respect to ease of training, all of the candidate weapons are suitable.

1.7.2.3 (C) The comparatively low scores achieved by the test soldiers with the M14 when firing the initial training marksmanship course are attributed to some degree to recoil. Initially, after limited training, test soldiers were able to achieve higher scores with the light recoil 5.56-mm weapons (rifles and carbines). However, when record fire was repeated 10 weeks later, higher scores were obtained with the M14 than with the light recoil 5.56-mm weapon (rifles and carbines) indicating that firers had improved with the M14 during the course of testing and had learned to compensate for recoil.

1.7.2.4 (C) Test soldiers scored higher in qualification firing with the M60 than with the Code S machine guns.

1.7.3 (C) RATE OF FIRE (Sub-Test No 3) (U)

1.7.3.1 (C) Firers are able to achieve close to all attempted size bursts with each of the candidate weapons.

1.7.3.2 (C) Of the burst sizes evaluated (excluding the attempted one round/trigger pull), the optimum number of rounds per burst in the full automatic mode for each of the candidate rifles, carbines, and automatic rifles, except the A-R, is the 3-round burst. The A-R's optimum burst size is 3- to 5-rounds.

1.7.3.3 (C) Of the burst sizes evaluated, the optimum number of rounds per burst for each of the candidate machine guns is the 6-round burst.

1.7.4 (C) SIGHTS (Sub-Test No 4) (U)

1.7.4.1 (C) It was not possible to determine standard sight settings or adjustments to achieve best accuracy results due to variation of each range in sight settings between candidate rifles, carbines, and automatic rifles.

1.7.4.2 (C) All candidate rifles, carbines, and automatic rifles have the inherent capability to align on the target at night provided the target can be detected with the unaided eye.

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1.7.4.3 (C) The M14, M14E2, and M60 sights are superior to all the other candidate weapons sights except for durability.

1.7.4.4 (C) With respect to durability, all the other candidate weapons sights are superior to the M14, M14E2, and M60 sights.

1.7.4.5 (C) The candidate weapons have the following number of shortcomings (ref App IV):

- a. S-R - 3
- b. S-C - 3
- c. XM16E1 - 3
- d. A-R - 3
- e. C-SMG - 3
- f. H-R - 3
- g. C-AR - 4
- h. S-AR - 6
- i. M60 - 1
- j. Code S machine gun - 5

1.7.5 (C) MAGAZINES (Sub-Test No 5) (U)

1.7.5.1 (C) With respect to the requirement for a minimum magazine capacity of 50 rounds, all of the candidate weapons are unsuitable.

1.7.5.2 (C) All candidate weapons are suitable with respect to their capability for being loaded in one operation from all firing positions.

1.7.5.3 (C) Poor functioning of the XM16E1, A-R, H-R, S-C, and C-SMG magazines contributed to the incidence of bolt overrides and double feeds with these weapons.

1.7.5.4 (C) The candidate weapons have the following number of deficiencies (ref App IV):

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- a. S-R - 1
- b. XM16E1 - 1
- c. H-R - 1
- d. A-R - 1
- e. S-C - 1
- f. C-SMG - 1
- g. S-AR - 1
- h. C-AR - 1

1.7.5.5 (C) The candidate weapons have the following number of shortcomings (ref App IV):

- a. M14 - 1
- b. S-R - 1
- c. XM16E1 - 1
- d. H-R - 1
- e. A-R - 1
- f. S-C - 1
- g. C-SMG - 1
- h. M14E2 - 1
- i. S-AR - 1
- j. C-AR - 1

1.7.6 (C) AMMUNITION AND PACKAGING (Sub-Test No 6) (U)

1.7.6.1 (C) With all candidate weapons tracer elements of both 7.62-mm and 5.56-mm tracer ammunition are satisfactorily visible under all light conditions.

1.7.6.2 (C) With all candidate weapons tracer ammunition is significantly more effective as a means of target ranging and target/sector of fire designation than ball and duplex ammunition.

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1.7.6.3 (C) With all candidate weapons tracer is more effective at night than other types of ammunition used.

1.7.6.4 (C) With 7.62-mm candidate rifles, carbines, and automatic rifles, there was a significant increase in hit capability during daylight with duplex ammunition at the shorter ranges.

1.7.6.5 (C) With the M60 machine gun there was a significant increase in hit capability with 4 duplex - 1 tracer ammunition mix at the shorter ranges.

1.7.6.6 (C) The candidate weapons have the following number of deficiencies:

C-SMG - 1

1.7.6.7 (C) The candidate weapons have the following number of shortcomings:

M14E2 - 1

1.7.7. (C) DEFENSE, DAY AND NIGHT (Sub-Test No 7) (U)

1.7.7.1 (C) The XM16E1 firing tracer ammunition and the M14 firing duplex ammunition are significantly more effective in the day defense than the other candidate rifles. The A-R firing tracer ammunition is significantly more effective in the night defense than the other candidate rifles.

1.7.7.2 (C) With respect to effectiveness of the candidate carbines, the M14 firing duplex ammunition and the S-C firing ball ammunition are the most effective in both the day and night defense.

1.7.7.3 (C) There is no significant difference in effectiveness between the candidate automatic rifles.

1.7.7.4 (C) The M60 firing 4 duplex - 1 tracer is significantly the most overall effective machine gun in both the day and night defense.

1.7.8 (C) ASSAULT (Sub-Test No 8) (U)

1.7.8.1 (C) In the day assault, the H-R, and the M14 firing duplex, are overall significantly more effective than the other candidate rifles. In the night assault, the A-R firing tracer was significantly more effective in hit capability than the other candidate rifles.

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1.7.8.2 (C) In the day assault, the M14 firing duplex has a significantly higher hit capability than the other candidate carbines. In the night assault, the M14 firing ball ammunition has a significantly higher hit capability than the other candidate carbines.

1.7.8.3 (C) In the day assault, there is no significant difference between the candidate automatic rifles, and in the night assault the S-AR firing tracer is significantly more effective than the other candidate automatic rifles.

1.7.8.4 (C) In the day and night assault there is no significant difference between the candidate light machine guns.

1.7.9 (C) MOUNTS (Sub-Test No 9) (U)

1.7.9.1 (C) Both the M60 and Code S machine guns have the capability of being used as hand-carried weapons fired from supported positions and as ground-mounted machine guns on sustained fire mounts.

1.7.9.2 (C) The candidate weapons have the following number of shortcomings (ref App IV):

Code S machine gun - 1

1.7.10 (C) RECORD AND TRANSITION FIRING (Sub-Test No 10) (U)

1.7.10.1 (C) The M14 average scores for the Record Marksmanship Course are higher than those of the other candidate rifles and carbines.

1.7.10.2 (C) The S-AR average scores, firing 4 ball to 1 tracer in transition firing, are higher than those of the other candidate automatic rifles.

1.7.10.3 (C) The M60-LMG average scores, firing 4 ball to 1 tracer in transition firing, are higher than those of the S-LMG.

1.7.11 (C) SIGNATURE CHARACTERISTICS (Sub-Test No 11) (U)

1.7.11.1 (C) There is no significant difference between the candidate rifles with respect to signature effects and firer exposure.

1.7.11.2 (C) Signature effects and firer exposure characteristics of the candidate carbines are comparable and acceptable except for the C-SMG. The C-SMG produces unacceptable flash and noise with ammunition loaded with ball type propellant (standard 5.56-mm ammunition). The use of CR propellant corrected this to an acceptable degree.

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1.7.11.3 (C) Signature effects and firer exposure characteristics of the candidate automatic rifles are comparable and acceptable except for the M14E2. The M14E2 produces excessive flash with M62 tracer ammunition.

1.7.11.4 (C) Signature effects and firer exposure characteristics of the candidate machine guns are comparable and acceptable.

1.7.11.5 (C) The candidate weapons have the following number of deficiencies (ref App IV):

C-SMG - 2 (1 previously reported, Sub-Test No 6, Ammunition)

1.7.11.6 (C) The candidate weapons have the following number of shortcomings (ref App IV):

M14E2 - 1 (previously reported, Sub-Test No 6, Ammunition and packaging)

1.7.12 (C) POINTED FIRE ACCURACY (Sub-Test No 12) (U)

1.7.12.1 (C) The effectiveness of the candidate rifles in the aimed and pointed fire accuracy (quick fire) role is comparable except for the XM16E1 which is significantly less effective in the semiautomatic pointed fire role.

1.7.12.2 (C) The S-C is significantly more effective in the aimed and pointed fire accuracy (quick fire) role than the other candidate carbines.

1.7.12.3 (C) The S-AR is significantly more effective in the automatic aimed and pointed fire accuracy (quick fire) role than the other candidate automatic rifles.

1.7.13 (C) PORTABILITY AND AERIAL DELIVERY (Sub-Test No 13) (U)

1.7.13.1 (C) All of the candidate weapons are suitable with respect to portability and aerial delivery.

1.7.13.2 (C) During the conduct of this sub-test the S-AR was found to be unreliable after exposure to sand, mud, and water.

1.7.13.3 (C) The C-AR and S-AR bipods tend to become detached from the weapons when the soldier "hits the ground."

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1.7.13.4 (C) The candidate weapons have the following number of deficiencies (ref App IV):

S-AR - 1

1.7.13.5 (C) The candidate weapons have the following number of shortcomings (ref App IV):

a. S-AR - 1

b. C-AR - 1

1.7.14 (C) ACCESSORIES AND TRAINING AIDS (Sub-Test No 14) (U)

1.7.14.1 (C) Special tools are needed for rear sight adjustment and zeroing of the H-R. This is undesirable.

1.7.14.2 (C) The M11 type cleaning rods lack durability.

1.7.14.3 (C) No cleaning rods were furnished for the S-R, H-R, C-SMG, S-C, C-AR or the S-AR.

1.7.14.4 (C) Only the M14 type (M2 bipod) bipod is both adjustable for height and capable of being folded when attached to the rifle.

1.7.14.5 (C) The candidate weapons have the following number of shortcomings (ref App IV):

a. S-R - 1

b. XM16E1 - 1

c. A-R - 1

d. H-R - 3 (1 previously reported, Sub-Test No 4, Sights)

e. S-C - 2

f. C-SMG - 2

g. S-AR - 3 (1 previously reported, Sub-Test No 13, Portability and Aerial Delivery)

h. C-AR - 4 (1 previously reported, Sub-Test No 13, Portability and Aerial Delivery)

i. M11 cleaning rod - 1

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## 1.7.15 (C) MAINTENANCE (Sub-Test No 15) (U)

1.7.15.1 (C) The ease of disassembly and assembly of the candidate weapons is suitable and the differences between weapons are not significant. The C-AR is significantly easier to disassemble and assemble than the other candidate automatic rifles.

1.7.15.2 (C) The ease of maintenance of the candidate weapons is acceptable.

1.7.15.3 (C) The maintenance packages furnished with the candidate weapons except for the M14, M14E2, and M60 were incomplete and inadequate.

1.7.15.4 (C) The candidate weapons have the following number of deficiencies (ref App IV):

- a. S-R -2
- b. S-C - 2
- c. S-AR - 1
- d. Code S machine guns - 1

1.7.15.5 (C) The candidate weapons have the following number of shortcomings (ref App IV):

- a. M14 -1
- b. S-R -3 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)
- c. A-R - 3
- d. XM16E1 - 2
- e. H-R - 2 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)
- f. S-C - 4 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)
- g. C-SMG - 4 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)
- h. M14E2 - 2
- i. C-AR - 3 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)

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- j. S-AR - 3 (1 previously reported, Sub-Test No 14, Accessories and Training Aids)
- k. M60 - 1
- l. Code S machine guns - 5
- m. M11 cleaning rod - 1 (previously reported, Sub-Test No 14, Accessories and Training Aids)

## 1.7.16 (C) DURABILITY AND RELIABILITY (Sub-Test No 16) (U)

1.7.16.1 (C) All of the candidate weapons were rugged enough to withstand normal usage. It is the opinion of test personnel that the M14, M14E2 and M60 were the most rugged candidate weapons overall.

1.7.16.2 (C) The M14 has a significantly lower, and the XM16E1 has a significantly higher, malfunction rate than the other candidate rifles and carbines.

1.7.16.3 (C) The M14E2 has a significantly lower malfunction rate than the other candidate automatic rifles.

1.7.16.4 (C) The M60 machine gun has a significantly lower malfunction rate than the Code S machine gun.

1.7.16.5 (C) The candidate weapons have the following number of deficiencies (ref App IV):

- a. S-R - 2
- b. XM16E1 - 3
- c. A-R - 5
- d. H-R - 1
- e. S-C - 2
- f. C-SMG - 1
- g. C-AR - 1
- h. S-AR - 2 (1 previously reported, Sub-Test No 13, Portability and Aerial Delivery)
- i. Code S machine guns - 12

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1.7.16.6 (C) The candidate weapons have the following number of shortcomings (ref App IV):

- a. M14 - 5
- b. S-R - 3
- c. H-R - 4
- d. A-R - 3
- e. XM16E1 - 6
- f. S-C - 3
- g. C-SMG - 1
- h. M14E2 - 2
- i. C-AR - 3
- j. S-AR - 2
- k. M60 - 4 (1 previously reported, Sub-Test No 4, Sights)
- l. Code S machine guns - 4

1.7.17 (C) VERSATILITY OF WEAPON DESIGN (Sub-Test No 17) (U)

1.7.17.1 (C) It is assumed that interchangeability of parts between different weapons in Infantry squads and platoons provides an operational advantage.

1.7.17.2 (C) Operational advantage provided by component interchangeability is greatest with the Code S family.

1.7.17.3 (C) The Code S family is the only candidate family that provides for versatility and component interchangeability in the weapons of the rifle platoon.

1.7.17.4 (C) Versatility of weapon design in terms of modes of fire and commonality of parts with other platoon weapons is best provided by the Code S family.

1.7.17.5 (C) Maximum commonality is achieved with both the 5.56-mm and 7.62-mm ammunition. Ammunition packaging is best provided by the current standard 7.62-mm family.

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1.7.17.6 (C) The Code S family provides the greatest interchange of assemblies between weapons.

1.7.18 (C) SAFETY (Sub-Test No 18) (U)

1.7.18.1 (C) The safety selector switches of all the candidate weapons are easily identifiable and conveniently located.

1.7.18.2 (C) The safety selector switches of the M14 and the M14E2 were positive in action. The XM16E1, A-R, C-SMG, C-AR, S-AR, and Code S machine guns will fire with the safety selector switch between the semiautomatic position and the fully automatic position.

1.7.18.3 (C) The safeties of the XM16E1, S-R, A-R, H-R, S-C, C-SMG, C-AR and S-AR are also selector switches. This is confusing.

1.7.18.4 (C) Safety restrictions requiring the use of ear plugs, because of noise and blast, are unacceptable in combat; the need for this safety restriction was not evaluated by the Infantry Board.

1.7.18.5 (C) The other safety restrictions imposed by the appropriate safety releases on the employment of all the candidate weapons except the M14, XM16E1, M14E2 and M60 machine guns are unacceptable for employment and use of the weapons by the infantryman.

1.7.18.6 (C) The frequency of runaway guns experienced with the S-AR is excessive.

1.7.18.7 (C) The gas and particles emitted by the Code S machine gun is a safety hazard.

1.7.18.8 (C) The low cook off level of the Code S machine guns is a safety hazard.

1.7.18.9 (C) The tendency of the feed cover latch of the Code S machine gun to fly apart when the feed cover is opened is a safety hazard.

1.7.18.10 (C) The candidate weapons have the following numbers of deficiencies (ref App IV):

- a. S-R - 1
- b. H-R - 1
- c. A-R - 1
- d. S-C - 1

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- e. C-SMG - 1
- f. C-AR - 1
- g. S-AR - 2
- h. Code S machine guns - 4 (2 previously reported, Sub-Test No 16, Reliability and Durability)

1.7.18.11 (C) The candidate weapons have the following numbers of shortcomings (ref App IV):

- a. M14 - 1
- b. M14E2 - 1
- c. S-R - 2
- d. S-C - 2
- e. XM16E1 - 1
- f. C-AR - 1
- g. C-SMG - 1
- h. A-R - 2
- i. S-AR - 2 (1 previously reported, Sub-Test No 16, Durability and Reliability)
- j. Code S machine gun - 1

1.7.19 (C) HUMAN FACTORS ENGINEERING (Sub-Test No 19) (U)

1.7.19.1 (C) There is no significant difference between the candidate weapons as to:

- a. Capability of being fired from either the right or left shoulder, except the S-AR which has sights offset to the left.
- b. Effects of smoke, blast, flash or noise, except for the C-SMG firing standard ball propellant ammunition which produced excessive flash and noise.
- c. Heat absorption from the sun.
- d. Heat transfer.

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1.7.19.2 (C) The M14 and M14E2 have the most effective safeties of all the candidate rifles, carbines and automatic rifles.

1.7.19.3 (C) The Code S machine guns demonstrated more rapid heat build up than the M60 machine gun.

1.7.19.4 (C) Dangerous gas and particles are emitted in the area of the assistant gunner's face with the Code S machine gun.

1.7.19.5 (C) The candidate weapons have the following number of deficiencies (ref App IV):

Code S machine gun - 1 (previously reported, Sub-Test No 16, Reliability and Durability)

1.7.19.6 (C) The candidate weapons have the following number of shortcomings (ref App IV):

- a. M14 - 3 (1 previously reported, Sub-Test No 16, Durability and Reliability)
- b. S-R - 2 (1 previously reported, Sub-Test No 4, Sights)
- c. H-R - 3 (1 previously reported, Sub-Test No 4, Sights)
- d. A-R - 3 (1 previously reported, Sub-Test No 4, Sights)
- e. XM16E1 - 3 (1 previously reported, Sub-Test No 4, Sights)
- f. S-C - 2 (1 previously reported, Sub-Test No 4, Sights)
- g. C-SMG - 2 (1 previously reported, Sub-Test No 4, Sights)
- h. M14E2 - 3 (1 previously reported, Sub-Test No 16, Durability and Reliability)
- i. C-AR - 2 (1 previously reported, Sub-Test No 4, Sights)
- j. S-AR - 4 (2 previously reported, Sub-Test No 4, Sights)
- k. Code S machine gun - 5 (3 previously reported, Sub-Test No 4, Sights)

1.7.20 (C) VALUE ANALYSIS (Sub-Test No 20) (U)

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1.7.20.1 (C) No nonessential or "nice-to-have" features were present on any of the candidate rifles, carbines or automatic rifles.

1.7.20.2 (C) The S-LMG and S-MMG should more properly be referred to as a single weapon which provides for use of the bipod and tripod whenever appropriate.

1.7.20.3 (C) A bipod case would not be needed with the Code S machine gun if a pocket for the bipod were added to the spare barrel carrying case.

## 1.8 (C) CONCLUSIONS (U)

The US Army Infantry Board concludes that:

a. There are no significant differences in the overall suitability for US Army use of the candidate rifles, carbines, and automatic rifles, except for reliability.

b. The M14 rifles and M14E2 automatic rifles are significantly more reliable than their counterpart candidates.

c. The M60 machine gun is significantly more suitable for US Army use than the Code S machine gun.

d. The use of duplex ammunition significantly increases hit capability.

## 1.9 (C) RECOMMENDATIONS (U)

The US Army Infantry Board recommends that:

No consideration be given to adoption of new weapons systems until a significant improvement over the standard 7.62-mm systems can be achieved.

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## SECTION 2 -- DETAILS AND RESULTS OF SUB-TESTS

### 2.0 (C) INTRODUCTION (U)

#### 2.0.1 (C) GENERAL (U)

2.0.1.1 (C) Testing was conducted in such a manner as to permit a comparison of weapon effectiveness between candidate weapons.

2.0.1.2 (C) Testing was conducted in such a manner as to permit the evaluation and comparison of candidate carbines to fill the rifle and automatic rifle role, the candidate rifles to fill the carbine and automatic rifle role, and the candidate machine guns to perform in the squad automatic rifle role.

2.0.1.3 (C) The candidate rifles and carbines were tested utilizing 30-man matched groups each firing two candidate rifles, and one 30-man group firing all candidate carbines. The M14 rifle was included in each test group, to equalize the effect of recoil and to provide comparative data. (Ref para 2.0.4.2b)

2.0.1.4 (C) The candidate automatic rifles and candidate machine guns were each tested using two matched 12-man groups of test soldiers.

2.0.1.5 (C) Throughout all testing when possible, firing was conducted in such a manner as to equalize learning within the different candidate weapon groups.

2.0.1.6 (C) To facilitate reporting and assist the reader, tables are included in results of testing, and are numbered within each sub-test in the sequence in which they appear. The sub-test number appears on each table as a prefix to the table number. Test data included in Appendix II are referred to as Charts, to differentiate this data from the tables located in Section 2 of the report.

2.0.1.7 (C) Objectives of sub-tests are stated in terms of specific objectives as required by the characteristics and standards; and general objectives not required by the characteristics and standards, but which are pertinent.

2.0.1.8 (C) It was intended that all candidate weapons be subjected to the same test conditions. However, delays in delivery of some test weapons and periodic test suspensions throughout the period of testing, resulted in weapons being tested under varying temperatures, light, weather conditions, and state-of-troop motivation.

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## 2.0.2 (U) METHOD OF ANALYSIS (U)

2.0.2.1 (U) In order to provide data with which to determine the effectiveness of the candidate weapons, three statistical measurements were recorded in each tactical exercise:

- a. Hit capability (HC), computed as a function of target hits/rounds fired and expressed as a percentage.
- b. Hit probability (HP), computed as a function of targets hit/rounds fired and expressed as a percentage.
- c. Percentage of targets hit (PTH), computed as a function of targets hit/total number of targets presented.

2.0.2.2 (U) In analyzing differences between candidate weapons, this Board determined the HC, HP, and PTH in each sub-test to be significant (where appropriate) by analyzing the methods used in the sub-test, and applying military judgment.

2.0.2.3 (U) It should be noted that numerical differences between candidate weapons were small in some sub-tests, and were not clearly significant differences. No effort has been made in this report to weight differences, but results obtained with the candidate weapons have been shown in appropriate charts and tables.

## 2.0.3 (U) OPINIONATIVE DATA (U)

Where appropriate, qualitative observations and judgments of experienced test personnel concerning performance, effectiveness, and suitability of candidate weapons were recorded separately from factual data, and were so indicated in this report.

## 2.0.4 (U) WEAPONS GROUPING (U)

2.0.4.1 (U) Throughout this report, the weapons will be referred to as Candidate Weapons, and Weapon Candidates. These are defined as follows:

2.0.4.1.1 (U) Candidate Weapons are weapons of a specific type, being considered in that type role only, for example, a rifle being considered in the rifle role. Candidate Weapons are defined as follows:

### Candidate Rifles:

- M14 rifle
- S-R rifle
- XM16E1 rifle
- H-R rifle
- A-R rifle

Candidate Carbines:

C-SMG carbine  
S-C carbine

Candidate Automatic Rifles:

M14E2 rifle  
S-AR rifle  
C-AR rifle

Candidate Machine Guns:

S-LMG machine gun  
M60-LMG machine gun  
S-MMG machine gun  
M60-MMG machine gun

2.0.4.1.2 (U) Weapon Candidates are weapons of any type, being considered in a specific type role only, for example, a rifle being considered in the carbine role. Weapon Candidates are defined as follows:

Rifle Candidates:

M14 rifle  
S-R rifle  
XM16E1 rifle  
H-R rifle  
A-R rifle  
S-C carbine  
C-SMG carbine

Carbine Candidates:

S-C carbine  
C-SMG carbine  
M14 rifle  
S-R rifle  
XM16E1 rifle  
H-R rifle  
A-R rifle

Automatic Rifle Candidates:

M14E2 rifle  
S-AR rifle  
C-AR rifle  
M14 rifle  
XM16E1 rifle  
S-R rifle  
H-R rifle  
A-R rifle  
S-C carbine  
C-SMG carbine  
M60-LMG machine gun  
S-LMG machine gun

Machine Gun Candidates:

M60-LMG machine gun  
M60-MMG machine gun  
S-LMG machine gun  
S-MMG machine gun

2.0.4.2 (U) Weapons were grouped for testing as follows:

Candidate Rifles:

Group I - M14 rifle and S-R rifle.  
Group II - M14 rifle and XM16E1 rifle  
Group III - M14 rifle and H-R rifle  
Group IV - M14 rifle and A-R rifle

Candidate Carbines:

S-C carbine  
C-SMG carbine

Candidate Automatic Rifles:

M14E2 rifle  
S-AR rifle  
C-AR rifle

Candidate Machine Guns:

S-LMG machine gun  
M60-LMG machine gun  
S-MMG machine gun  
M60-MMG machine gun

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## 2.1 (C) SUB-TEST NO 1, PREOPERATIONAL INSPECTION AND PHYSICAL CHARACTERISTICS (U)

### 2.1.1 (C) OBJECTIVES (U)

#### 2.1.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### 2.1.1.1.1 (C) General (U)

To determine if the candidate rifles, carbines, automatic rifles, their components, and accessories were in the proper condition for test.

##### 2.1.1.1.2 (C) Specific (U)

To determine capability of (ref para 2, Part I, App III):

a. Delivering selectively, semiautomatic, full automatic, and controlled burst automatic fire.

b. Independent use as a lightweight rifle, separately from the area fire portion of the weapon.

c. Accepting a folding type bipod for use in the full automatic mode.

d. Minimizing length by substituting a stock group that folds or slides forward.

To evaluate:

a. Simplicity in Design and Construction: Maximum permitted by other required characteristics (ref para 3a(1), Part I, App III).

b. Weight: Minimum permitted by other required characteristics (ref para 3a(2), Part I, App III).

c. Length: Minimum permitted by other required characteristics (ref para 3a(3), Part I, App III).

d. Bayonet: The weapon's capability of accepting a bayonet (ref para 3a(7), Part I, App III).

##### 2.1.1.2 (C) Machine Guns (U)

##### 2.1.1.2.1 (U) General (U)

To determine if the candidate machine guns were in proper condition for test.

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## 2.1.1.2.2 (C) Specific (U)

a. (C) To determine if the bipod is lightweight, durable, attachable and detachable (ref para 1a(7), Part II, App III).

b. (C) To evaluate:

(1) Simplicity in Design and Construction: Maximum permitted by other required characteristics (ref para 1a(1), Part II, App III).

(2) Weight: Minimum permitted by other required characteristics (weapon and mount) (ref para 1a(2), Part II, App III).

(3) Length: Minimum permitted by other required characteristics (ref para 1a(3), Part II, App III).

(4) Shoulder Stock: Configuration, lightweight, and ruggedness (ref para 1a(9), Part II, App III).

## 2.1.2 (C) METHOD (U)

### 2.1.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.1.2.1.1 (C) Throughout all other tests, data pertaining to the above were noted.

2.1.2.1.2 (C) The candidate rifles, carbines, automatic rifles, their components, and accessories were examined for completeness using the manufacturers' Preliminary Operating and Maintenance Manual (POMM) and current instructional material as a guide. The candidate rifles, carbines, and automatic rifles were initially hand-operated and subsequently fired to ascertain that they were in proper operating condition. In the examination, particular attention was given to the determination of the following:

a. The provision of a selector to permit firing in the semi-automatic, full automatic, and controlled burst automatic modes of fire.

b. The provision for the attachment and removal of the area fire weapon and independent use as a rifle.

c. The provision of a folding bipod which could be readily detached from or attached to the candidate rifles and carbines.

d. The provision of a means of minimizing the length of the weapons by means of a folding or sliding butt stock.

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e. The ability to detach from and attach the area fire portion of the weapon to the candidate rifles.

f. The provision of a tamper-proof means to render the automatic fire and/or controlled burst group mechanism inoperative.

2.1.2.1.3 (C) A comparative evaluation was made with respect to simplicity of design and construction.

2.1.2.1.4 (C) The candidate rifles, carbines, and automatic rifles were weighed and measured.

2.1.2.1.5 (C) The bayonet provided was attached and detached to confirm this capability.

2.1.2.1.6 (C) Photographs were taken of each type candidate rifle, carbine, and automatic rifle.

2.1.2.2 (C) Machine Guns (U)

2.1.2.2.1 (C) The candidate machine guns and their components and accessories were examined for completeness using the manufacturer's POMM and current instructional material as a guide. The candidate machine guns were hand-operated. Upon receipt of a safety release all weapons were fired to ascertain that they were in operating condition. In the examination, particular attention was given to the determination of the following:

a. The provision of a lightweight, adjustable, attachable, and detachable bipod, and tripod.

b. The configuration and weight of the shoulder stock.

c. The functioning of the manual safeties.

2.1.2.2.2 (C) A comparative evaluation was made with respect to simplicity of design and construction of the candidate machine guns.

2.1.2.2.3 (C) The candidate machine guns were weighed and measured.

2.1.2.2.4 (C) Photographs were taken of each type candidate machine gun.

2.1.2.2.5 (C) The durability and ruggedness of the bipod and stock were noted during all tests and reported in Sub-Test No 16, Durability and Reliability.

2.1.3 (C) RESULTS (U)

2.1.3.1 (C) Rifles (U)

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2.1.3.1.1 (C) An examination of the candidate rifles, their components, and accessories revealed that they were in the proper condition for test.

2.1.3.1.2 (C) All of the candidate rifles had selector switches for firing in the semiautomatic and full automatic mode. None of the candidate rifles were equipped with a controlled burst device.

2.1.3.1.3 (C) All of the candidate rifles were capable of independent use as a lightweight rifle, separately from an area fire capability. Each candidate rifle, according to the manufacturer's brochure, could fire rifle grenades as the area fire portion of the weapon; however, this capability was not confirmed. The M14 required a grenade launcher to be attached for firing rifle grenades.

2.1.3.1.4 (C) The M14's and H-R's were the only candidate rifles equipped with a folding bipod. All of the candidate rifles were equipped with a quick detachable bipod. The M14 bipod was not as quickly attached and detached as were the bipods for the other candidate rifles.

2.1.3.1.5 (C) The A-R was the only candidate rifle possessing a means of minimizing stock length. The A-R achieved this through the use of a folding stock. The other candidate rifles possessed a fixed length butt stock.

2.1.3.1.6 (C) Except for the sight systems of the XM16E1, S-R, H-R, and A-R, all of the candidate rifles were simple in design and construction. The XM16E1 was considered by the test soldiers to be the simplest to disassemble and assemble.

2.1.3.1.7 (C) All of the candidate rifles would accept a bayonet except that the bayonet could not be attached to the A-R when the bipod was attached.

2.1.3.1.8 (C) Photographs of the candidate rifles appear in Figures 1 and 2, and 5 through 7, Appendix V.

2.1.3.1.9 (C) Weights and measurements of the candidate rifles are shown in Table 1-1.

2.1.3.2 (C) Carbines (U)

2.1.3.2.1 (C) Using the manufacturer's PQMM, the candidate carbines were found to be complete, in operating condition, and in proper condition for test.

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2.1.3.2.2 (C) S-C's and C-SMG's were equipped to selectively provide semi-automatic or full automatic fire capability. The M14's were received without automatic selector switches, but the automatic selectors were installed prior to the requirement for use of automatic fire in testing. None of the candidate carbines were equipped with a controlled burst device.

TABLE 1-1

## WEIGHTS AND MEASUREMENTS (AVERAGE) - RIFLES

Weights in Pounds, Measurements in Inches

WEIGHTS	M14	XM16E1	S-R	A-R	H-R
Rifle w/o magazine and sling	9.1	6.6	7.9	6.8	7.8
Magazine, empty	.5	.2	.5	.2	.3
Magazine, full	1.5	.7	1.5	.9	.8
Sling	.3	.3	.3	.3	.2
Bipod w/case	1.7	1.0	1.4	1.0	1.2
Rifle fully loaded w/sling	11.5	7.6	9.5	7.8	8.8
Rifle fully loaded w/bayonet	12.2	8.2	10.2	8.4	9.4
Bayonet w/scabbard	1.0	1.0	1.0	1.0	.9
MEASUREMENTS					
Length of Rifle	44.1	38.8	40.3	38.0	36.9
Length of Bayonet	11.8	11.8	11.8	11.5	12.1
Length of Rifle w/Bayonet	51.0	44.0	45.3	42.8	43.0
Length of rifle w/stock folded	---	---	---	28.8	---
Height of sight above the bore	1.2	2.4	2.1	1.6	3.3
Sight radius	26.8	19.8	21.94	200-20.00 400-19.50	19.00

\* 30-round magazines

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2.1.3.2.3 (C) Weapon length could be minimized by utilization of a folding stock group in S-C's and by a slide-lock group on the C-SMG's. The M14's had no provision for minimizing weapon length.

2.1.3.2.4 (C) Except for the sight systems of the S-C and C-SMG, the candidate carbines were simple in design and construction.

3.1.3.2.5 (C) S-C's and C-SMG's had no provision to render the automatic fire mechanism inoperative, other than moving the selector switch to the semiautomatic firing position. The M14 automatic fire selector mechanism can be removed from the weapon, restricting the weapon to delivery of only semiautomatic fire.

2.1.3.2.6 (C) There was no provision for mounting a bayonet on the C-SMG. The S-C has provision for a bayonet, but none was furnished.

2.1.3.2.7 (C) Photographs of candidate carbines appear in Figures 1, 8, and 9, Appendix V.

2.1.3.2.8 (C) Weights and measurements of candidate carbines are shown in Table 1-2.

### 2.1.3.3 (C) Automatic Rifles (U)

2.1.3.3.1 (C) Upon examination, it was noted that:

a. Seven of the M2 bipods issued with M14E2's were not modified by the addition of a sling swivel.

b. All of the C-AR's were initially issued without cleaning materials or magazines. The magazines were subsequently received; however, the cleaning materials for the C-AR's were not received during the course of testing. Cleaning materials issued for the XM16E1 rifle were used.

2.1.3.3.2 (C) Preliminary inspection indicated that all candidate automatic rifles appeared to be in proper operating condition for test. Initial firing disclosed that four S-AR's repeatedly failed to function properly and were not in proper operating condition. After an approval had been obtained from USATECCOM, a modification was made by the manufacturer's representative to enlarge the gas port diameter; thereafter, the S-AR functioned more satisfactorily.

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TABLE 1-2

## WEIGHTS AND MEASUREMENTS (AVERAGE) - CARBINES

Weights in Pounds, Measurements in Inches

WEIGHTS	M14	S-C	C-SMG
Carbine w/o magazine and sling	9.1	6.8	5.0
Magazine, empty	0.5	0.5	0.2
Magazine, full	1.5	1.3*	1.0*
Sling	.3	.3	.3
Carbine, fully loaded w/sling	11.5	8.3	6.3
Carbine, fully loaded w/bayonet	12.2	---	---
Bayonet w/scabbard	1.0	---	---
MEASUREMENTS			
Length of carbine	44.1	37.4	30.0
Length of bayonet	11.85	---	---
Length of carbine w/bayonet	51.0	---	---
Length of carbine w/stock folded	---	26.6	---
Length of carbine w/stock compressed	---	---	27.3
Height of sight above the bore	1.2	2.1	2.4
Sight radius	26.2	21.5	14.8

\* 30-round magazines (S)

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2.1.3.3.3 (C) The M14E2 and the C-AR contained a selector to permit firing either in the semiautomatic or full automatic mode of fire. The S-AR could be fired in the full automatic mode only. None of the automatic rifles were equipped with a controlled burst device.

2.1.3.3.4 (C) All of the candidate automatic rifles were equipped with bipods; however, only the M14E2 bipod could be folded while attached to the weapon. The C-AR and the S-AR came with pouches designed for carrying their respective bipods attached to the pistol belt. The C-AR was designed to accept the M2 rifle bipod as well as the design furnished for test.

2.1.3.3.5 (C) None of the candidate automatic rifles made provision for minimizing the length of the weapon by means of a folding or sliding stock.

2.1.3.3.6 (C) None of the candidate automatic rifles were provided with a separate area fire weapon. It is not known whether the C-AR or the S-AR had the capability of launching rifle grenades. The M14E2 can fire a rifle grenade, but this requires the addition of an M76 grenade launcher.

2.1.3.3.7 (C) The automatic fire capability of the M14E2 could be rendered inoperative by removal of the selector switch. The automatic fire capability of the C-AR and the S-AR could not be rendered inoperative. The C-AR had a non-removable selector switch, and the S-AR was capable of automatic fire only.

2.1.3.3.8 (C) Except for the sight systems of the C-AR and S-AR, all of the automatic rifle candidates were simple in design and construction.

2.1.3.3.9 (C) The weights and measurements of the automatic rifle candidates are shown in Table 1-3.

2.1.3.3.10 (C) The M14E2 was not designed to mount a bayonet. The C-AR and the S-AR appear to have been designed to mount bayonets and contain a bayonet stud, but no bayonets were provided.

2.1.3.3.11 (C) Photographs of the automatic rifle candidates appear in Figure 3, Appendix V.

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TABLE 1-3

## WEIGHTS AND MEASUREMENTS (AVERAGE) - AUTOMATIC RIFLES

Weights in Pounds, Measurements in Inches

WEIGHTS	M14E2	C-AR	S-AR
Rifle w/o magazine, sling, and bipod	10.1	8.3	10.2
Magazine, empty	.5	.2	.5
Magazine, full	1.6	1.0*	1.3*
Sling	.4	.3	.3
Bipod	1.8	.5	.9
Bipod w/case containing cleaning equipment and bipod	N/A	.8	1.5
Rifle fully loaded w/sling and bipod	13.9	10.1	12.7
MEASUREMENTS			
WEAPON: Length	44.5	38.8	40.3
Width at butt of stock	2.1	1.6	1.4
Width at front handguard	1.3	2.8	2.1
Height at butt of stock	5.3	5.1	4.6
BIPOD: Height, extended	16.1	10.2	12.9
Height, closed	12.1	N/A	9.1
Span at base w/bipod extended	20.3	14.7	12.8
SLING**: Length	67.2	45.3	45.3
Width	1.6	1.6	1.6
MAGAZINE: Length	6.2	7.3	7.4
Width	3.0	2.5	2.5
Thickness	1.0	0.9	0.9
BIPOD CASE: Length	N/A	13.5	11.9
Width	N/A	2.9	4.5
Thickness	N/A	1.3	1.1
SIGHT RADIUS	26.8	19.8	22.2

\* 30-round magazines

\*\* Slings for the C-AR and the S-AR were not provided by the manufacturers. M14 rifle slings were used for the C-AR and S-AR.

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## 2.1.3.4 (C) Machine Guns (U)

2.1.3.4.1 (C) Upon examination of the candidate machine guns, it was noted that:

a. No manufacturer's POMM's were initially provided for the Code S machine guns.

b. No slings were provided for the S-IMG's; M60 machine gun slings were used throughout the test for these weapons.

c. The M60 machine guns provided for this test were not the latest design.

2.1.3.4.2 (C) Buffer assemblies, bolt plugs, drive spring guides, and operating rods of a later design were requested for, and placed in, the M60 machine guns. These modifications were completed on 24 August 1965.

2.1.3.4.3 (C) Preliminary inspection and limited firing indicated that all candidate machine guns were in proper operating condition for test.

2.1.3.4.4 (C) The M60 machine guns and the S-IMG's were equipped with bipods. Table 1-4 depicts the characteristics of the different types of bipods.

TABLE 1-4

### BIPODS - MACHINE GUNS

WEAPON	WEIGHT (lbs)	METHOD OF ATTACHMENT	ADJUSTABILITY
M60-IMG	2.02	Not removable at unit level.	Adjustable for length, folds back underneath weapon when not in use.
M60-MMG	2.02	Not removable at unit level.	Adjustable for length, folds back underneath weapon when not in use.
S-IMG	.88	Clamps on w/o use of tools	Adjustable for length, will not fold back underneath weapon
S-MMG	N/A	No bipod, but will accept same bipod as S-IMG.	

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2.1.3.4.5 (C) The M60 machine guns and the S-LMG's were equipped with stocks. Table 1-5 depicts the characteristics of the different types of stocks.

TABLE 1-5

## WEIGHTS - MACHINE GUN STOCKS

WEAPON	WEIGHT (lbs)	UTILITY
M60-LMG	1.48	Hinged shoulder rest, cannot be fired w/o stock.
M60-MMG	1.48	Hinged shoulder rest, cannot be fired w/o stock.
S-LMG	0.67	No hinged shoulder rest, can be fired w/o stock.
S-MMG	N/A	No stock, but will accept same stock as S-LMG.

2.1.3.4.6 (C) Preliminary inspection and firing indicated that all manual safeties of the candidate machine guns were functioning properly.

2.1.3.4.7 (C) The M60 machine guns were simple in design and construction. The Code S machine guns were simple in design and construction, except that the sight system was complex, requiring adjustments to both front and rear sights (ref Sub-Test No 4, Sights).

2.1.3.4.8 (C) The weights and measurements of the candidate machine guns are depicted in Table 1-6.

2.1.3.4.9 (C) Photographs of the candidate machine guns appear in Figures 4 and 10, Appendix V.

### 2.1.4 (C) ANALYSIS (U)

#### 2.1.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.1.4.1.1 (C) The candidate rifles, carbines, and automatic rifles, their components and accessories, except the S-AR, were received in proper condition for test.

2.1.4.1.2 (C) All of the candidate rifles, carbines, and automatic rifles are capable of delivering selectively, semiautomatic and full automatic fire with the exception of the S-AR, which fires full automatic only. None of the candidate rifles, carbines, and automatic rifles are capable of delivering controlled burst automatic fire.

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TABLE 1-6

## WEIGHTS AND MEASUREMENTS (AVERAGE) - MACHINE GUNS

Weights in Pounds, Measurements in Inches

WEIGHTS	M60-IMG	M60-MMG	S-IMG	S-MMG
Machine gun w/o sling, mount, or accessories	23.3	23.3	11.3	10.8
Bipod	2.2	2.2	.9	N/A
Tripod	N/A	11.9	N/A	10.9
Traversing and elevating mechanism	N/A	3.8	N/A	3.1
Sling	.3	.3	.3	N/A
Pintle and platform	N/A	3.5	N/A	3.6
Spare barrel	8.6	8.6	4.1	4.1
Accessory case, spare barrel, and maintenance equipment	13.3	13.3	6.1	6.1
Bipod case	N/A	N/A	.3	N/A
Bandoleer w/150 rounds	N/A	N/A	4.9	N/A
Assault case w/100 rounds	7.5	N/A	N/A	N/A
MEASUREMENTS				
Length of machine gun	43.8	43.8	40.3	30.8
Width of machine gun at widest point	4.8	4.8	4.0	4.0
Length of barrel	25.8	25.8	21.8	21.8
Height on tripod	N/A	18.8	N/A	15.8
Height on bipod	14.1	N/A	12.5	N/A
Sight radius	21.3	21.3	22.4	22.4

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2.1.4.1.3 (C) All of the candidate rifles, carbines, and automatic rifles are capable of independent use, separately from the area fire portion of the weapon.

2.1.4.1.4 (C) All of the candidate rifles, carbines, and automatic rifles accept a bipod, except the S-C and the C-SMG; however, the M14, the H-R, and the M14E2 are the only candidate rifles, carbines, or automatic rifles capable of accepting a folding type bipod. With minor modifications, the C-AR will accept the M2 Bipod; however, the M3 Bipod issued with the C-AR does not fold.

2.1.4.1.5 (C) The A-R, the S-C and the C-SMG are the only candidate rifles, carbines, or automatic rifles with which a folding or sliding stock group is used to minimize length.

2.1.4.1.6 (C) Except for the sight systems, there is no significant difference in simplicity of design and construction of the candidate rifles, carbines, and automatic rifles.

2.1.4.1.7 (C) In the opinion of the test officer, the weight of each of the candidate rifles, carbines and automatic rifles, with the exception of the M14 as a carbine candidate, is the minimum permitted by other required characteristics. The C-SMG is significantly lighter than any of the other candidate weapons.

2.1.4.1.8 (C) In the opinion of the test officer, the length of each of the candidate rifles, carbines, and automatic rifles, with the exception of the M14 as a carbine candidate, is the minimum permitted by other required characteristics.

2.1.4.1.9 (C) All of the candidate rifles, carbines, and automatic rifles satisfactorily accept a bayonet with the exception of the C-SMG, the M14E2 and the C-AR. The C-AR will not accept any of the bayonets furnished for test. The A-R does not accept a bayonet with the bipod attached.

## 2.1.4.2 (C) Machine Guns (U)

2.1.4.2.1 (C) The candidate machine guns were in proper condition for test.

2.1.4.2.2 (C) The M60-IMG, M60-MMG, and the S-IMG were the only candidate machine guns capable of accepting a bipod. The bipod of the M60-IMG and M60-MMG is lightweight and durable but not attachable and detachable. The bipod of the S-IMG is lightweight and is attachable and detachable.

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2.1.4.2.3 (C) Except for the sight systems, there is no significant difference in simplicity of design and construction of the candidate machine guns.

2.1.4.2.4 (C) In the opinion of the test officer, the weight of each of the candidate machine guns is the minimum permitted by other required characteristics; however, the Code S machine guns are significantly lighter than the M60 machine guns.

2.1.4.2.5 (C) In the opinion of the test officer, the length of each of the candidate machine guns is the minimum permitted by other required characteristics; however, the length of the Code S machine guns is more suitable than the length of the M60 machine guns.

2.1.4.2.6 (C) The M60-IMG, M60-MMG, and S-IMG are equipped with lightweight and foldable stocks (ref Table 1-5). With respect to configuration and weight, the stocks of the Code S machine guns are more suitable than the stocks of the M60 machine guns.

### 2.1.4.3 (C) Shortcoming of the Candidate Weapons (U)

#### (C) S-AR (U)

The lack of a semiautomatic capability.

#### (C) C-SMG (U)

The inability of the C-SMG to accept a bayonet.

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## 2.2 (C) SUB-TEST NO 2, TRAINING (U)

### 2.2.1 (C) OBJECTIVES (U)

#### 2.2.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### 2.2.1.1.1 (C) General (U)

To evaluate the candidate rifles, carbines, and automatic rifles with respect to ease of training test soldiers.

##### 2.2.1.1.2 (C) Specific (U)

To determine:

a. The availability and suitability of weapon instructional manuals. (Ref para 9, Part I, App III.)

b. The best firing positions and techniques of fire. (Ref para 8a, Part I, App III.)

#### 2.2.1.2 (C) Machine Guns (U)

##### 2.2.1.2.1 (C) General (U)

To evaluate the candidate machine guns with respect to ease of training individual test soldiers.

##### 2.2.1.2.2 (C) Specific (U)

To determine:

a. Availability and suitability of weapon instructional manuals. (Ref para 8, Part II, App III.)

b. Firing positions, techniques of fire, and size of crew. (Ref para 7a, Part II, App III.)

## 2.2.2 (C) METHOD (U)

### 2.2.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.2.2.1.1 (C) Upon completion of Sub-Test No 1, Preoperational Inspection and Physical Characteristics, a training program was conducted, designed to train individual test soldiers to become suitably proficient with the candidate rifles, carbines, and automatic rifles to begin testing. The training program included as a minimum the following:

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- a. Nomenclature and functioning -- 1 hour.
- b. Disassembly and assembly -- 4 hours.
- c. Care, cleaning and maintenance -- 1 hour.
- d. Safety precautions -- 1 hour.
- e. Sights and zeroing -- 2 hours.
- f. Qualification firing and target detection -- 8 hours.
- g. Testing procedures -- 1 hour.

2.2.2.1.2 (C) During the conduct of the training program outlined in paragraph 2.2.2.1.1, special attention was given to the following:

- a. The ease of training of the test soldiers with each type candidate rifle.
- b. The adequacy of the instructional manuals provided by the manufacturers.
- c. The determination of the test firing positions and techniques of fire for each type candidate weapon.

2.2.2.1.3 (C) Rifle and carbine test groups fired the Record Marksmanship Course, and refired the same course 10 weeks later. The automatic rifle test group fired the Standard Transition Course, and also refired the course 6 weeks later. Results were used to measure the learning and proficiency of the test soldiers.

### 2.2.2.2 (C) Machine Guns (U)

2.2.2.2.1 (C) Upon completion of essential portions of Sub-Test No 1, Preoperational Inspection and Physical Characteristics, a training program was conducted which was designed to train individual test soldiers to become sufficiently proficient with the candidate machine guns to begin testing. The following hours of instruction were given on the M60 and Code S machine guns:

- a. Nomenclature and functioning -- 1 hour.
- b. Disassembly and assembly -- 3 hours.
- c. Care, cleaning and maintenance procedures -- 1 hour.
- d. Safety precautions -- 1 hour.

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- e. Sights and zeroing -- 2 hours.
- f. Qualification firing -- 8 hours.
- g. Testing procedures -- 1 hour.

2.2.2.2.2 (C) During the conduct of the training program outlined in paragraph 2.2.2.2.1, special attention was given to the following:

- a. The ease of training of test soldiers with each candidate machine gun.
- b. The adequacy of the instructional manuals provided by the manufacturer.
- c. The determination of firing positions, techniques of fire, and size of crew for the Code S machine guns.

2.2.2.2.3 (C) The basic 10-meter and transition courses were fired, and 6 weeks later refired for record purposes. The results were used to measure the learning and proficiency of the test soldiers.

### 2.2.3 (C) RESULTS (U)

#### 2.2.3.1 (C) Rifles (U)

2.2.3.1.1 (C) With respect to ease of training test soldiers as outlined in paragraph 2.2.2.1.1, the following was observed:

- a. For disassembly and assembly, there was no significant difference in time required for training.
- b. The M14 and H-R sights were the easiest for test soldiers to learn to manipulate and zero.
- c. During the qualification firing phase the recoil of the M14 affected test soldiers and frequent flinching was observed.

2.2.3.1.2 (C) Weapon instructional manuals (FM or POMM's) were available for the candidate rifles. However, the H-R POMM was received on 27 October 1965, when 95 per cent of the test was completed.

2.2.3.1.3 (C) The best firing positions and techniques of fire were developed by the US Army Infantry School (USAIS) concurrently with the conduct of this sub-test. Recommended techniques and firing positions were published in USAIS ST 23-8-1 (Reference 16, Appendix I), for the S-R. Appropriate field manuals, FM 23-8 and

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FM 23-9, were consulted for firing techniques and positions to be used with the M14 and XM16E1, respectively. No special texts have been written for the A-R and H-R; however, the POMM and current field manuals were used as guides. The same firing techniques and positions used with the XM16E1 were used satisfactorily with the A-R and the H-R's.

2.2.3.1.4 (C) The results of the Record Marksmanship Course are indicated in Table 2-1.

TABLE 2-1

## RECORD MARKSMANSHIP COURSE

### RIFLES

WEAPON	AVG SCORE	EX	SS	MKS	UNQ	M14 AVG SCORE	EX	SS	MKS	UNQ
Group I S-R	50.1	16	10	4	1	34.0	0	7	19	5
Group II XM16E1	52.0	18	11	3	0	34.3	0	7	20	5
Group III H-R	39.0	2	14	11	3	34.7	1	6	20	3
Group IV A-R	42.9	7	11	11	1	34.6	1	9	15	5
Ten Weeks Later										
Group I S-R	45.6	8	14	8	0	47.0	8	18	4	0
Group II XM16E1	42.2	8	13	9	0	47.3	11	13	5	1
Group III H-R	45.3	11	10	8	1	53.5	19	6	5	0
Group IV A-R	45.3	9	13	7	1	50.4	15	9	6	0

LEGEND: EX - Expert, 51 and over  
SS - Sharpshooter, 40-50  
MKS - Marksman, 27-39  
UNQ - Unqualified, 0-26

2.2.3.2 (C) Carbines (U)

2.2.3.2.1 (C) Field manuals and POMM's were available for training with the candidate carbines.

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2.2.3.2.2 (C) Recommended firing positions and techniques of fire were published in USAIS Special Texts 23-8-1 (ref 16, App I) and 23-16-2 (ref 18, App I) for the S-C and C-SMG's, respectively.

2.2.3.2.3 (C) Because of the short configuration of the C-SMG, it was necessary that firing positions be modified to achieve maximum weapon-firer compatibility. The short length of the C-SMG made it necessary for the firer in the prone unsupported position to place the right elbow well out from his body and slightly forward so that his shoulders would be approximately level. The firer exerted firm rearward pressure with his right hand to insure weapon stability.

2.2.3.2.4 (C) To assume a good standing position with the C-SMG, the firer had to support the greatest portion of the weapon weight with his right arm and place the left hand under the front hand-guard of the weapon primarily as a means to steadying the weapon.

2.2.3.2.5 (C) Throughout all training and testing, it was necessary to exert firm rearward pressure with the right hand when firing the C-SMG to avoid canting the weapon.

2.2.3.2.6 (C) Record Marksmanship Course average scores by weapon type are shown in Table 2-2.

2.2.3.2.6 (C) RECORD MARKSMANSHIP COURSE

## RECORD MARKSMANSHIP COURSE

### CARBINES

WEAPON	AVG SCORE	EX	SS	MKS	UNQ
M14	34.6	0	10	17	3
S-C	53.3	15	12	3	0
C-SMG	36.1	1	7	20	2
Ten Weeks Later					
M14	55.1	23	3	4	0
S-C	46.1	11	11	7	1
C-SMG	41.5	19	10	7	4

LEGEND: EX - Expert, 51 and above  
SS - Sharpshooter, 40-50  
MKS - Marksman, 27-39  
UNQ - Unqualified, 0-26

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## 2.2.3.3 (C) Automatic Rifles (U)

2.2.3.3.1 (U) Prior to the conduct of any test firing, the training specified in paragraph 2.2.2.1.1 was conducted.

2.2.3.3.2 (C) The 25-meter preparatory marksmanship course prescribed in paragraph 18 of FM 23-16 (ref 13, App I) was fired by 11 firers with the candidate automatic rifles. This firing exercise was modified by deleting Section III, Automatic Fire, Fire Distribution, and Magazine Changing Exercises. The results of the 25-meter preparatory marksmanship course are indicated in Table 2-3.

TABLE 2-3

### 25-METER PREPARATORY MARKSMANSHIP COURSE

#### AUTOMATIC RIFLES

\*(Per cent of satisfactory scores by position)

11 Firers

	SQUAT- TING	KNEEL- ING	KNEEL- ING SPT	STAND- ING	BIPOD SPT PRONE	BIPOD SPT FOXHOLE	AVG OF ALL PSNS
M14E2	54.5	81.8	45.4	63.6	27.3	27.3	50.0
C-AR	36.4	81.8	81.8	9.1	54.5	45.4	51.8
S-AR	27.3	45.4	9.1	27.3	27.3	36.5	28.8

\*No qualifying score is established. Each test soldier either satisfactorily or unsatisfactorily completed each position exercise.

2.2.3.3.3 (C) There were no significant differences between candidate automatic rifles in the ease of training test soldiers.

2.2.3.3.4 (C) The results of automatic rifle firing conducted on the machine gun transition firing course are indicated in Tables 2-4A and 2-4B.

## 2.2.3.4 (C) Machine Guns (U)

2.2.3.4.1 (C) No instructional manual or POMM was provided by the manufacturer of the Code S machine guns in time for the training phase of this test; however, selected USAIB personnel attended a school on the candidate machine guns held by US Army Weapons Command prior to the beginning of the test. FM 23-67 (ref 4, App I) was used as a guide throughout the test. As soon as they

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TABLE 2-4A  
TRANSITION FIRING, AUTOMATIC RIFLES AND MACHINE GUNS

Firer No	AUTOMATIC RIFLES **				MACHINE GUNS ***			
	M14E2 4 Ball: 1 Tracer	M14E2 Duplex	C-AR 4 Ball: 1 Tracer	S-AR 4 Ball: 1 Tracer	Firer No	M60-IMG 4 Ball: 1 Tracer	M60-IMG 4 Duplex 1 Tracer	S-IMG 4 Ball: 1 Tracer
1	40	40	40	60	152	40	50	40
3	30	50	30	60	153	60	70	30
5	30	70	0	50	158	50	70	40
6	50	50	30	10	160	50	30	30
7	50	60	60	80	162	40	50	40
8	10	30	10	30	163	50	50	50
9	50	60	40	60	167	40	40	30
10	20	40	50	40	174	60	40	20
12	10	20	50	60	180	60	60	40
14	40	60	20	0	173	30	60	60
AVERAGE	33	48	33	45	AVERAGE	48	52	38

Point score was determined by multiplying target hits by 10. The maximum score on each lane was 80.  
 \* Automatic rifles and machine guns were allotted the same amount of ammunition for each exercise.  
 \*\* Fired in 2- to 3-round bursts.  
 \*\*\* Fired in 6 round bursts.

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TABLE 2-43

TRANSITION FIRING

AUTOMATIC RIFLES AND MACHINE GUNS\*

FIRER NO	AUTOMATIC RIFLES **				MACHINE GUNS ***		
	M14E2 4 Ball 1 Tracer	M14E2 4 Dupl: 1 Tracer	C-AR 4 Ball: 1 Tracer	S-AR 4 Ball: 1 Tracer	M60-LMG 4 Ball: 1 Tracer	M60-LMG 4 Dupl: 1 Tracer	S-LMG 4 Ball: 1 Tracer
2	40	50	50	30	80	70	70
4	40	10	50	70	80	60	80
5	50	50	30	70	60	60	40
6	60	40	40	50	50	50	50
8	50	60	20	60	50	70	60
9	70	60	40	30	60	50	10
11	10	30	30	40	40	50	30
12	10	60	50	60	70	60	70
13	60	30	60	50	70	70	50
14	10	30	20	40	80	70	40
AVERAGE	40	42	39	50	64	61	50

Point score was determined by multiplying target hits by 10. The maximum possible score on each lane was 80.

\* Automatic rifles and machine guns were allotted the same amount of ammunition for each exercise.

\*\* Fired in 3-round bursts.

\*\*\* Fired in 6-round bursts.

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were received, POMM 9-1005-270-12 (ref 37, App I), POMM 9-1005-269-12/1 (ref 34, App I), and US Army Infantry School (USAIS) Special Text 23-67-1 (ref 19, App I) were evaluated and used.

2.2.3.4.2 (C) The firing positions, techniques of fire, and size of crew for the M60 machine guns were taught using the procedures listed in FM 23-67. The firing positions, techniques of fire, and size of crew for the Code S machine guns are listed in USAIS Special Text 23-67-1, and were considered adequate. These are essentially the same as those prescribed for the M60 machine guns, with the exception that a modified firing position must be used with the S-MMG and the S-LMG. Since the path of ejected cartridges is downward in the vicinity of the traversing and elevating mechanism, the firer could not leave his left hand on the mechanism when firing the S-MMG without being burned. A modified position was used in which the firer placed his left hand on the left side of the receiver, steadying the weapon (ref Fig 11, App V). Since the S-LMG was not equipped with a hinged butt plate as is the M60-LMG, the firer could not apply pressure downward and to the rear as is taught with the M60-LMG.

2.2.3.4.3 (C) There was no significant difference in the ease of training the test soldiers with the Code S machine guns and the M60 machine guns. None of the test soldiers had any prior experience with Code S machine guns and only one test soldier had significant prior experience with the M60 machine gun.

2.2.3.4.4 (C) The results of the qualification firing conducted during the training phase, and of qualification firing conducted approximately 6 weeks later, are listed in Table 2-5.

2.2.3.4.5 (C) When fired, Code S machine guns sometimes emitted gas and particles from the feed port which prevented assistant gunners from getting close to the left side of the gun. The gas also adversely affected the ability of the test soldiers to aim and fire. (Ref Sub-Test No 18, Reliability and Durability.)

2.2.4 (C) ANALYSIS (U)

2.2.4.1 (C) Rifles (U)

2.2.4.1.1 (C) Weapon instructional manuals (FM's and POMM's) were available and suitable for training with the candidate rifles.

2.2.4.1.2 (C) The firing positions and techniques of fire described in appropriate FM's and USAIS special texts were suitable and comparable for all candidate rifles.

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TABLE 2-5  
MACHINE GUNS

WPN	10-Meter Paster Tripod Mounted				400-800-Meter Transition Course, Bipod Mounted				Total-Qualification Score			
	POSSIBLE	HIGH	LOW	AVG of 10	POSSIBLE	HIGH	LOW	AVG of 10	POSSIBLE	HIGH	LOW	AVG of 10
M60	104	89	65	76.5	80	60	30	48	184	149	105	124.5
Code S	104	87	72	78.6	80	60	20	38	184	133	105	116.6
					2nd FIRING (6 weeks later)							
M60	104	95	81	85.4	80	80	40	64	184	167	121	149.4
Code S	104	90	51	75.5	80	80	30	50	184	166	91	125.5

WPN - Weapon

AVG - Average

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2.2.4.1.3 (C) The comparatively low scores achieved by the test soldiers with the M14 when firing the Record Marksmanship Course are attributed to some degree to recoil. Initially, after limited training, test soldiers were able to achieve higher scores with the light recoil 5.56-mm weapons. However, when record fire was repeated 10 weeks later, higher scores were obtained with the M14, indicating that firers had improved with the M14 during the course of testing and had learned to compensate for recoil.

2.2.4.1.4 (C) With respect to ease of training, all of the candidate rifles were suitable.

### 2.2.4.2 (C) Carbines (U)

2.2.4.2.1 (C) Weapon instructional manuals (FM's and POMM's) were available and suitable for training with the candidate carbines.

2.2.4.2.2 (C) The firing positions and techniques of fire, described in appropriate FM's and USAIS Special Texts, were suitable and comparable for all candidate carbines.

2.2.4.2.3 (C) The comparatively low scores achieved by the test soldiers with the M14 when firing the Record Marksmanship Course are attributed to some degree to recoil. Initially, after limited training, test soldiers were able to achieve higher scores with the light recoil 5.56-mm weapons. However, when Sub-Test No 10, Record Fire, was conducted 10 weeks later, higher scores were obtained with the M14, indicating that firers had improved with the M14 during the course of testing and had learned to compensate for recoil.

2.2.4.2.4 (C) With respect to ease of training, all of the candidate carbines were suitable.

### 2.2.4.3 (C) Automatic Rifles (U)

2.2.4.3.1 (C) Weapon instructional manuals (FM's and POMM's) were available and suitable for training with the candidate automatic rifles.

2.2.4.3.2 (C) The firing positions and techniques of fire, described in appropriate FM's and USAIS special texts, were suitable and comparable for all candidate automatic rifles.

2.2.4.3.3 (C) In the opinion of the test officer, more training in positions and steady hold factors may be necessary with the S-AR to enable firers to obtain satisfactory shot groups.

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2.2.4.3.4 (C) With respect to ease of training, all of the candidate automatic rifles were suitable.

### 2.2.4.4 (C) Machine Guns (U)

2.2.4.4.1 (C) Weapon instructional manuals (FM's and POMM's) were available and suitable for training with the candidate machine guns.

2.2.4.4.2 (C) The firing positions and techniques of fire, described in appropriate FM's and USAIS Special Texts, were suitable and comparable for the candidate machine guns.

2.2.4.4.3 (C) The 7.9-point higher average score recorded with the M60 machine gun in the first qualification firing (Table 2-5) was not considered significant. However, the 23.9-point higher average score recorded in the second qualification firing was considered significant (Table 2-5).

2.2.4.4.4 (C) There was no discernible difference between the candidate machine guns in respect to ease of training the test soldiers in their use.

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## 2.3 (C) SUB-TEST NO 3, RATE OF FIRE (U)

### 2.3.1 (C) OBJECTIVE (U)

#### General

To determine (ref 40, App 1):

- a. Firer capability to obtain any given number of rounds per burst for full automatic fire with the existing cyclic rate of fire.
- b. The optimum number of rounds per burst for full automatic fire with respect to hit capability and hit probability with the existing cyclic rate of fire.
- c. The rapid fire hit capability for controlled bursts from candidate weapons with this feature.

### 2.3.2 (C) METHOD (U)

#### 2.3.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.3.2.1.1 (C) Five test soldiers from each test group fired the candidate rifles, carbines, and automatic rifles assigned to their group at point and area targets located at ranges of 200, 350, 500, 600, and 800 meters. The automatic mode of fire was used, and firers were instructed to control the burst using trigger manipulation. With candidate rifles, carbines, and automatic rifles, the test soldiers used four burst sizes: 3 rounds/trigger pull; 5 rounds/trigger pull; 7 rounds/trigger pull; and 10 rounds/trigger pull at each target located at each range. Additionally, the candidate rifles and carbines were fired in the semi-automatic mode to obtain comparative data for 1 round/trigger pull; the candidate automatic rifle test soldiers also attempted to fire one round per trigger pull in the automatic mode. The exercise was conducted in the prone position, with and without the bipod (if provided with weapon), using ball ammunition. The test soldiers with the candidate carbines did not fire the M14 at point targets, but fired the M14 with duplex ammunition at the area targets. The actual burst size was recorded; the average size of all repetitions was computed. The total number of trigger pulls, total number of rounds fired, total number of targets hit, target hits, and firer capability to control the size of burst in the automatic mode were recorded.

2.3.2.1.2 (C) None of the candidate weapons were equipped with a controlled burst device, therefore, no firing was conducted in this mode.



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## 2.3.2.2 (C) Machine Guns (U)

2.3.2.2.1 (C) Ten test soldiers fired the candidate machine guns from the bipod and the tripod at a linear target and a column target at ranges of 300, 500, and 1,000 meters. Both the linear and column targets consisted of eight "E" type silhouette targets in a tactical array. At each range, test soldiers engaged first one target array and then shifted fire to the other target array. Ten trigger pulls of 4-1 mix ball and tracer ammunition were fired by each test soldier at each target array, with each type candidate machine gun. The exercise was conducted with the test soldier attempting to fire in bursts of 3, 6, 10, and 15 rounds. The number of rounds actually fired with each trigger pull, time to fire the ten trigger pulls, total time to fire at both arrays, the number of silhouette targets hit, and target hits were recorded.

2.3.2.2.2 (C) The ability of the firer to control the number of rounds in a burst was determined.

2.3.2.2.3 (C) None of the candidate machine guns were equipped with a controlled burst device, therefore, no firing was conducted in this mode.

## 2.3.3 (C) RESULTS (U)

### 2.3.3.1 (C) Rifles (U)

2.3.3.1.1 (C) The average burst size, fired at both point and area targets located at all ranges, is indicated in Table 3-1.

2.3.3.1.2 (C) The effectiveness of various burst sizes is indicated in Table 3-2. (Charts 3-1 and 3-2; App III.)

2.3.3.1.3 (C) Test soldiers had little difficulty with any of the candidate rifles in controlling the burst size in the automatic mode using trigger manipulation. However, it was necessary to practice trigger manipulation for each size burst with each rifle prior to firing the exercise.

2.3.3.1.4 (C) The M14 was the most difficult of the candidate rifles to control in automatic fire, both with and without the bipod.

2.3.3.1.5 (C) With all of the candidate rifles, and particularly with the M14, where burst sizes in excess of three rounds were delivered, the weapon could not be suitably controlled by the firer.

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TAB 1-1

AVERAGE BURST SIZE

RIFLES

WEAPON	ATTEMPTED BURST SIZE									
	1*		3		5		7		10	
	With Bipod	Without Bipod	With Bipod	Without Bipod	With Bipod	Without Bipod	With Bipod	Without Bipod	With Bipod	Without Bipod
M14	1.0	1.0	2.9	3.0	5.0	5.0	6.9	7.2	9.8	9.8
S-R	1.0	1.0	3.1	3.0	5.2	5.4	7.6	7.4	9.7	9.9
XM16E1	1.0	1.0	3.1	3.0	5.1	5.0	6.8	6.8	9.6	9.6
H-R	1.0	1.0	2.9	2.9	4.9	4.7	6.5	6.6	9.6	9.8
A-R	1.0	1.0	3.0	2.9	4.7	4.5	6.8	7.0	9.7	9.8

\* Semiautomatic Fire

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TABLE 3-2

## EFFECTIVENESS OF VARIOUS BURST SIZES, RIFLES

(Summary of All Ranges)

WEAPON	ATT BURST SIZE	WITH BIPOD			WITHOUT BIPOD		
		POINT	AREA		POINT	AREA	
		HC	HC	HP	HC	HC	HP
M14	1*	20.6	10.8	8.4	16.4	17.2	13.6
	3	5.8	7.1	5.8	3.1	3.9	3.4
	5	2.5	4.7	3.5	1.6	2.0	1.8
	7	4.0	4.0	2.7	1.6	1.7	1.6
	10	2.8	3.5	2.3	1.1	1.9	1.4
S-R	1*	22.0	28.4	22.0	18.0	20.4	16.4
	3	6.0	9.4	6.9	9.7	8.8	7.3
	5	3.1	7.2	5.0	3.0	2.7	2.4
	7	4.2	4.6	2.7	2.2	3.1	2.4
	10	3.7	4.7	2.3	1.5	2.2	1.7
XM16E1	1*	18.0	13.6	11.6	25.6	16.8	14.0
	3	5.3	7.2	5.4	5.3	4.9	4.1
	5	3.4	5.2	3.1	2.7	3.8	2.8
	7	4.7	4.9	2.8	2.5	2.0	1.6
	10	2.7	5.2	2.3	1.6	2.3	2.0
H-R	1*	15.2	19.2	14.0	14.0	12.4	10.4
	3	6.8	4.9	4.5	4.0	3.3	3.3
	5	3.3	3.9	3.1	2.3	2.5	2.2
	7	2.4	1.4	1.2	1.3	2.6	2.2
	10	1.0	2.4	1.5	1.1	2.2	1.5
A-R	1*	24.8	16.0	14.8	20.8	26.4	22.4
	3	4.7	5.8	5.5	3.8	9.2	6.3
	5	5.7	6.2	4.1	4.6	5.9	5.1
	7	3.4	4.7	3.0	2.8	4.6	3.1
	10	3.0	3.7	2.1	2.1	3.5	2.5

### LEGEND:

HC - Hit Capability  
 HP - Hit Probability  
 \* - Semiautomatic Fire

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2.3.3.1.6 (C) All of the candidate rifles became uncomfortably hot to cold when firing the 7- and 10-round bursts. The test soldiers stated that the M14 and H-R became the hottest. Six of the M14's became so hot that the wood forestock caught on fire, and the stock had to be disassembled and the fire extinguished. It should be pointed out, however, that the M14 and XM16E1 could be used to complete an exercise, whereas the other candidate rifles, because of safety limitations (ref 15, App I), had to be cooled frequently. In some cases four candidate rifles of a type were required to complete an exercise.

2.3.3.1.7 (C) When test soldiers fired the M14 in automatic fire in burst sizes in excess of five rounds, considerable discomfort was experienced. The front and top of the shoulder was bruised by the metal butt plate and the hinged butt plate.

### 2.3.3.2 (C) Carbines (U)

2.3.3.2.1 (C) The average burst size, fired at both point and area targets located at all ranges, is indicated in Table 3-3.

TABLE 3-3  
AVERAGE BURST SIZE  
CARBINES

WEAPON	ATTEMPTED BURST SIZE				
	1*	3	5	7	10
M14	1.0	3.1	5.4	7.3	9.5
S-C	1.0	3.1	5.2	7.0	9.7
C-SMG	1.0	3.1	5.0	7.0	9.9

\* Semiautomatic Fire

2.3.3.2.2 (C) The effectiveness of various burst sizes is indicated in Table 3-4. (Chart 3-3, App II.)

2.3.3.2.3 (C) Test soldiers had little difficulty with any of the candidate carbines in controlling the burst size in the automatic mode using trigger manipulation. However, it was necessary to practice trigger manipulation for each size burst with each candidate carbine prior to firing the exercise.

2.3.3.2.4 (C) With all of the candidate carbines, and particularly with the M14, where burst sizes in excess of three rounds were delivered, the weapon could not be suitably controlled by the firer.

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TABLE 3-4

## EFFECTIVENESS OF VARIOUS BURST SIZES, CARBINES

Summary of . 1 Ranges

(Without Bipod)

WEAPON	ATT BURST SIZE	POINT	AREA	
		HC	HC	HP
M14	1*	**	13.5	10.1
	3	---	6.7	4.3
	5	---	2.1	2.0
	7	---	2.8	2.2
	10	---	1.9	1.6
S-C	1*	8.3	7.0	5.9
	3	4.3	5.4	5.0
	5	2.4	3.5	3.0
	7	1.6	3.3	2.1
	10	1.4	2.3	1.7
C-SMG	1*	3.4	3.1	2.8
	3	3.2	3.3	2.6
	5	1.7	2.2	2.0
	7	1.8	3.1	2.1
	10	1.6	2.3	1.5

### LEGEND:

HC - Hit Capability

HP - Hit Probability

\* - Semiautomatic Fire

\*\* - The M14 rifle was not used to engage point targets but was fired at area targets using M198 ammunition. Reference Table 3-2 for point target HC of M14 rifle.

2.3.3.2.5 (C) The M14 and S-C became uncomfortably hot to hold when firing the 7- and 10-round bursts. The C-SMG became uncomfortably hot to hold when firing any of the burst sizes in the automatic mode. It should be pointed out that the M14 could be used to complete an exercise, whereas the S-C and C-SMG, because of safety limitations (ref 15, App I) had to be cooled frequently; in some cases, four candidate carbines of these latter types were required to complete an exercise.

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## 2.3.3.3 (C) Automatic Rifles (U)

2.3.3.3.1 (C) The average burst size, fired at both point and area targets located at all ranges, is indicated in Table 3-5.

2.3.3.3.2 (C) The effectiveness of various burst sizes is indicated in Table 3-6 (Charts 3-4 and 3-5, App II).

2.3.3.3.3 (C) Test soldiers had difficulty using the automatic mode to fire 1 round/trigger pull. It was easier to fire 1 round/trigger pull with the M14E2 than with the C-AR or the S-AR using trigger manipulation.

2.3.3.3.4 (C) Test soldiers had little difficulty with any of the candidate automatic rifles in controlling the remaining burst sizes in the automatic mode using trigger manipulation. However, it was necessary to practice trigger manipulation for each burst size with each automatic rifle prior to firing the exercise.

2.3.3.3.5 (C) The M14E2 was the most difficult of the candidate automatic rifles to control with and without the bipod when delivering automatic fire.

2.3.3.3.6 (C) The C-AR became uncomfortably hot to hold when firing the 7- and 10-round bursts. The M14E2 and S-AR became hot, but the heat did not affect the firer's control.

TABLE 3-5

### AVERAGE BURST SIZE, AUTOMATIC RIFLES

WEAPON	ATTEMPTED BURST SIZE									
	1		3		5		7		10	
	With Bipod	W/O Bipod	With Bipod	W/O Bipod	With Bipod	W/O Bipod	With Bipod	W/O Bipod	With Bipod	W/O Bipod
M14E2	1.3	1.5	3.0	3.0	5.0	4.8	6.5	6.8	10.0	9.8
C-AR	2.0	2.2	3.0	3.0	4.9	4.8	7.0	6.9	9.9	9.7
S-AR	2.1	2.1	3.0	3.0	5.1	5.1	7.1	7.1	9.9	9.9

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TABLE 3-6

## EFFECTIVENESS OF VARIOUS BURST SIZES AUTOMATIC FIRE

### Summary of All Ranges

WEAPON	ATTEMPTED BURST SIZE	POINT	AREA	
		HC	HC	HP
M14E2	1	13.0	11.3	8.2
	3	7.8	6.8	5.2
	5	4.7	6.1	3.9
	7	3.4	4.2	2.8
	10	2.1	3.9	2.1
C-AR	1	9.0	12.6	9.1
	3	6.0	9.1	7.1
	5	3.6	3.9	2.5
	7	3.6	4.6	3.1
	10	2.8	3.5	2.4
S-AR	1	9.3	7.7	6.2
	3	8.1	8.6	5.6
	5	7.5	7.3	4.8
	7	3.4	6.4	3.4
	10	3.8	4.6	2.0

#### LEGEND:

HC - Hit Capability  
HP - Hit Probability

#### 2.3.3.4 (C) Machine Guns (U)

2.3.3.4.1 (C) The average burst size and the average time to fire at both of two target arrays (one linear and one column) at all ranges are indicated in Table 3-7.

2.3.3.4.2 (C) The effectiveness of various burst sizes is indicated in Table 3-8 (Chart 3-6, App II).

2.3.3.4.3 (C) When questioned as to which size of burst was the easiest to obtain consistently with each of the candidate machine guns, 13 test soldiers answered as listed in Table 3-9.

2.3.3.4.4 (C) When questioned as to which candidate machine gun was the easiest to manipulate while attempting to obtain a particular size of burst, 13 test soldiers answered as follows: M60-MMG, 7; M60-LMG, 5; S-LMG, 1; S-MMG, 0.

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TABLE 3-8

## EFFECTIVENESS OF VARIOUS BURST SIZES MACHINE GUNS

Summary of All Ranges

WEAPON	ATTEMPTED BURST SIZES	HC	HP	PTH
M60-LMG	3	16.0	10.0	36.0
	6	13.5	6.8	50.0
	10	9.1	3.8	50.4
	15	10.5	3.3	60.2
M60-MMG	3	12.7	8.4	34.6
	6	16.1	8.3	60.2
	10	11.4	5.1	63.5
	15	9.5	3.3	61.3
S-LMG	3	12.6	8.6	32.5
	6	11.9	6.3	48.3
	10	10.2	4.1	54.3
	15	9.7	3.3	58.1
S-MMG	3	13.3	8.3	32.7
	6	9.7	6.1	46.3
	10	7.3	3.4	44.3
	15	8.2	3.0	53.5

### LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

TABLE 3-9

## OPINIONS ON BURST SIZE MACHINE GUNS

Weapon	3-rd Burst	6-rd Burst	10-rd Burst	15-rd Burst
M60-LMG	3	7	2	1
M60-MMG	1	7	4	1
S-LMG	5	6	1	1
S-MMG	5	6	0	2

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## 2.3.4 (C) ANALYSIS (U)

### 2.3.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.3.4.1.1 (C) With respect to the firer capability to obtain any given number of rounds per burst for full automatic fire with the existing cyclic rate of fire, the five test soldiers from each test group are able to achieve close to all the attempted size bursts with each of the candidate rifles, carbines, and automatic rifles. None of the candidate weapons are significantly superior in trigger manipulation.

2.3.4.1.2 (C) Of the burst sizes evaluated (excluding the attempted 1 round/trigger pull) the optimum number of rounds per burst in the full automatic mode for each of the candidate rifles, carbines, and automatic rifles, except the A-R, is the 3-round burst. The A-R's optimum burst size is determined to be a 3- to 5-round burst.

2.3.4.1.3 (C) Burst sizes of more than three rounds with any of the candidate rifles and carbines are relatively ineffective against targets either with or without the bipod, because of the firer's inability to control the weapon suitably. The candidate automatic rifles are easier to control with the 3-, 5-, and 7-round bursts than are the candidate rifles and carbines.

### 2.3.4.2 (C) Machine Guns (U)

2.3.4.2.1 (C) With respect to the firer capability to obtain any given number of round. per burst for full automatic fire with the existing cyclic rate of fire, the ten test soldiers are able to achieve close to all the attempted size bursts with each of the candidate machine guns. Neither of the candidate machine guns is significantly superior in trigger manipulation.

2.3.4.2.2 (C) Of the burst sizes evaluated, the optimum number of rounds in the automatic mode per burst for each of the candidate machine guns is the 6-round burst.

2.3.4.2.3 (C) Although the cyclic rate of the Code S machine gun is higher than the M60, the time to complete an exercise with the Code S was greater because of the difficulty in observing and adjusting fire at long ranges with 5.56-mm ammunition. Additionally, time to apply immediate action in clearing malfunctions was included in the time to fire.

2.3.4.2.4 (C) The differences in hit capability and hit probability obtained with all candidate machine guns when firing different burst sizes are not significant. The highest hit capability with the M60-MMG is obtained with the 6-round burst although there is no significant difference from the hit capability obtained with the 3-round burst. The highest hit capability with the Code S machine guns is

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obtained with the 3-round burst although there is no significant difference from the hit capability obtained with the 6-round burst. All of the candidate machine guns achieves a higher hit probability with the 3-round burst than with any other burst size; however, the differences between the 3- and 6-round bursts are slight. The test soldiers are able to hit a significantly greater percent of the exposed targets with the 6-round burst than with the 3-round burst, indicating better target coverage. There is not a corresponding increase in target coverage when using the 10-round or 15-round bursts. Of the burst size evaluated, the optimum number of rounds per burst for full automatic fire with respect to hit capability, hit probability, and percent of hits with the existing cyclic rate of fire is determined to be six rounds. This tends to confirm the soundness of the current procedure to fire machine guns in 6-9 round bursts for maximum effectiveness of fire.

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## 2.4 (C) SUB-TEST NO 4, SIGHTS (U)

### 2.4.1 (C) OBJECTIVE (U)

#### 2.4.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

##### 2.4.1.1.1 (C) To determine:

a. Sight settings or adjustments to achieve best accuracy results. (Ref para 8d, Part I, App III.)

b. Inherent capability to align on the target at night and other conditions of limited visibility (to include artificial illumination), provided the target can be detected with the unaided eye. (Ref para 3a(5), Part I, App III.)

##### 2.4.1.1.2 (C) To evaluate:

a. Sights: Simple and durable integral sight(s) having positive settings and appropriate visual scales for determining zero and not requiring special tools for adjustment. (Ref para 3a(5), Part I, App III.)

b. The performance with night sighting devices such as the Individual Night Vision Weaponsight. (Ref para 3a(5), Part I, App III.)

#### 2.4.1.2 (C) Machine Guns (U)

##### Specific

##### 2.4.1.2.1 (C) To determine:

a. Sight settings or adjustments to achieve best accuracy results. (Ref para 7d, Part II, App III.)

b. The inherent capability to align on the target during all conditions of limited visibility (to include artificial illumination), provided the target can be detected with the unaided eye. (Ref para 1a(5), Part II, App III.)

##### 2.4.1.2.2 (C) To evaluate:

a. Sight: Simple, durable, and integral sight having positive settings and appropriate visual scale for determining zero and not requiring special tools for adjustment. (Ref para 1a(5), Part II, App III.)

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b. Performance of the weapon with night sighting devices such as the Individual Night Vision Weaponsight. (Ref para 1a(5), Part II, App III.)

## 2.4.2 (C) METHOD (U)

### 2.4.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.4.2.1.1 (C) Throughout all testing where the candidate rifles, carbines, and automatic rifles were zeroed and fired; particular attention was given to the sights to determine if they were simple, durable, integral, possessed appropriate visual scales for determining zero, and if there were any requirements for special tools for sight adjustment. Sight settings or adjustments to achieve best accuracy were noted and the maximum range to which the sights could be adjusted was recorded.

2.4.2.1.2 (C) On a known distance range using "A", "B", and "C" type targets as appropriate, each test soldier zeroed and fired one 10-round shot group with each candidate rifle, carbine, or automatic rifle in his test group using the semiautomatic mode of fire at ranges of 250 meters, 600, 800, and 1,000 yards from the prone sandbag supported position using ball and, where appropriate, duplex ammunition. The M14 firing duplex ammunition could not be zeroed at 600 yards, except by one firer. Firing was moved to the 500-yard line in an attempt to obtain data at the maximum range. The M14E2, firing duplex ammunition, could be zeroed at 600 yards, but not at 800 yards. The total number of rounds required for zero, the sight setting, and score at each range were recorded. A determination as to whether the sights had positive settings and appropriate visual scales for determining zero was made. Vertical and horizontal measurements of each projectile impact were recorded and the center of impact and offset for each 10-round shot group were computed. The average offset was computed and compared for each candidate rifle, carbine, and automatic rifle. The candidate rifles, carbines, and automatic rifles were zeroed when the center impact of a 3-round shot group and at least 2 of the 3 shots impacted within the black bull's-eye of the target.

2.4.2.1.3 (C) A limited visibility firing exercise was conducted on a night firing range which contained silhouette targets placed at ranges of 50 and 75 meters from the firing points. Ten rounds were fired from each candidate rifle, carbine, and automatic rifle at the silhouette targets at each range, at dusk, or on a moonlit night, when the targets could be detected with the unaided eye. Ball and tracer ammunition was used. The exercise was repeated at night, using artificial illumination. One group of M14 firers repeated the exercise using duplex ammunition. Target hits were recorded.

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2.4.2.1.4 (C) The candidate rifles, carbines, and automatic rifles, with the Night Vision Weaponsight attached, were not tested because no Night Vision Weaponsights were furnished with the candidate weapons.

2.4.2.1.5 (C) An exercise to verify the calibration of the candidate automatic rifle sights was conducted. Using ball ammunition, five of each type candidate automatic rifle were zeroed at 250 meters and the sights were calibrated. A 5-round shot group was then fired at this range. Then 5-round shot groups were fired from each of these automatic rifles at ranges of 300, 400, 500, and 600 meters; the candidate automatic rifles were not rezeroed, but the appropriate setting was made on the sight using the range scale.

### 2.4.2.2 (C) Machine Guns (U)

2.4.2.2.1 (C) Ten test soldiers fired each type of candidate machine gun at an array of eight silhouette targets located at ranges of 200, 500, 800, and 1,000 meters. Each test soldier fired five 6-round bursts at each range, using 4-1 mix of ball and tracer ammunition. Prior to firing, each test soldier zeroed his machine gun at 500 meters, by adjusting the movable range scale on the M60 machine gun sights, and by adjusting the front sight post on the Code S machine guns. Exercise No 1 was fired using the range scale on the rear sight. Exercise No 2 was fired with each test soldier zeroing his machine gun at each range; the movable range scales on the rear sights were not used in this second exercise. Because of the difficulty in zeroing 5.56-mm ammunition beyond 500 meters, a squad leader with binoculars and two protected observers located to the flank of the target area were utilized to assist in zeroing. Due to safety restrictions on the Code S machine guns, barrels were changed at the most convenient point before the limit of 200 rounds was reached (Reference 25, Appendix I). The number of targets hit and target hits was recorded. The suitability of the respective visual scales for determining zero was evaluated. The effectiveness of feedback in assisting the test soldiers to place fire on the targets was noted.

2.4.2.2.2 (C) During the conduct of Sub-Test No 7, Defense, Day and Night, the inherent capability to align on the target with the candidate machine guns was evaluated during all conditions of limited visibility (to include artificial illumination), provided the target could be detected with the unaided eye.

2.4.2.2.3 (C) During the conduct of this and all other firing tests, note was made of any sight settings or adjustments to sights which increased accuracy.

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2.4.2.2.4 (C) During the conduct of all sub-tests, the simplicity and durability of the sights of the candidate machine guns were noted. The need for special tools to adjust sights was noted.

2.4.2.2.5 (C) The test soldiers zeroed each of the two barrels with the candidate machine guns on panel targets at 500 meters. The barrel changing capability of each candidate machine gun was evaluated with respect to times required and difficulties encountered in changing hot and cold barrels.

### 2.4.3 (C) RESULTS (U)

#### 2.4.3.1 (C) Rifles (U)

2.4.3.1.1 (C) The M14 rear sight had positive settings and appropriate visual scales for determining zero. It did not require a special tool for adjustment. (Figure 12, Appendix V.)

2.4.3.1.2 (C) The S-R, XM16E1, and A-R front sights (Figures 13 through 15, Appendix V) were stamped to indicate the direction for movement of the point of impact of the round. The front sights had positive settings, but did not have appropriate visual scales for determining zero. A special tool or a cartridge was required for adjustment of the front sight post. The rear sight assembly provided short or long range settings and windage adjustments. The S-R and XM16E1 rear sights had positive settings and appropriate visual scales for adjusting windage. The A-R rear sight had positive settings; however, it did not contain visual scales for determining zero and adjusting windage.

2.4.3.1.3 (C) The H-R sight (Figure 16, Appendix V) consisted of a front ring and post sight and a 4-position rotary rear sight, adjustable for elevation and windage. The four positions included an open notched auxiliary (250 meters) and three aperture positions (0-200; 200-400, over 400 meters). The rear sight had the four positive settings for elevation noted above, but none for windage. However, there were no visual scales for determining zero, or for adjusting windage. A special combination tool and a Phillips screwdriver were required for sight adjustments (Figure 55, Appendix V).

2.4.3.1.4 (C) The S-R, XM16E1, and A-R front sight post could be elevated to the point where the front sight detent would come out of its recess. In addition, the rotating sight post could be unscrewed completely from its recess.

2.4.3.1.5 (C) The M14 sight had sight settings and adjustments to achieve accuracy up to and including 1,000 yards. The S-R, XM16E1, H-R, and A-R sights had sight settings and adjustments to achieve accuracy up to and including 600 yards.

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2.4.3.1.6 (C) The relative accuracy achieved with the candidate rifles and their sights is indicated in Table 4-1.

2.4.3.1.7 (C) The relative accuracy achieved with the candidate rifles and their sights during periods of limited visibility is indicated in Table 4-2.

2.4.3.1.8 (C) It was the opinion of the test officer who tested the Night Vision Weaponsight that suitable brackets for the use of night sighting devices could be fabricated for all of the candidate rifles.

2.4.3.1.9 (C) No significant difficulty was encountered in aligning the candidate rifles on targets at dusk or at night under artificial illumination.

2.4.3.2 (C) Carbines (U)

2.4.3.2.1 (C) The S-C and C-SMG sights were identical to the S-R and XM16E1 sights described in paragraphs 2.4.3.1.2 and 2.4.3.1.4, except the C-SMG had a shorter sight radius than the XM16E1.

2.4.3.2.2 (C) The M14 sight had sight settings and adjustments to achieve accuracy up to and including 1,000 yards. The S-C and C-SMG had sight settings and adjustments to achieve accuracy up to and including 600 yards and 400 yards, respectively.

2.4.3.2.3 (C) The relative accuracy achieved with candidate carbines and their sights is indicated in Table 4-3.

2.4.3.2.4 (C) The relative accuracy achieved with the candidate carbines and their sights during periods of limited visibility is indicated in Table 4-4.

2.4.3.2.5 (C) It was the opinion of the test officer who tested the Night Vision Weaponsight that suitable brackets for the use of night sighting devices could be fabricated for all of the candidate carbines.

2.4.3.2.6 (C) No significant difficulty was encountered in aligning the candidate carbines on targets at dusk or at night under artificial illumination.

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TABLE 4-1

SIGHTS, DAY - RIFLES

WEAPON	AMMO	250 METERS						400 YARDS					
		AZ	AV SC	AV ES	AV MR	AV OS	AZ	AV SC	AV ES	AV MR	AV OS	AZ	AV SC
M14	M80	26.2	28.4	34.2	10.6	8.7	15.6	35.0	42.5	12.5	11.0	15.6	35.0
	M198*	18.2	29.4	29.1	9.1	9.2	15.8	36.0	35.4	11.7	11.0	15.8	36.0
S-R	M193	12.0	29.4	24.6	7.4	9.5	13.0	37.2	34.4	10.6	11.8	13.0	37.2
	M193	14.8	29.9	23.5	7.1	10.9	13.7	37.0	32.1	10.4	12.1	13.7	37.0
XM16E1	M193	24.6	30.3	29.4	9.0	8.6	17.3	35.2	40.5	12.5	11.3	17.3	35.2
	M193	20.3	35.0	20.5	6.6	7.7	12.8	38.3	29.3	10.0	14.5	12.8	38.3
M14	M80						31.8	30.3	52.1	17.0	10.9	31.8	30.3
	M198*	27.2	32.9	41.1	12.9	13.0							
S-R	M193						27.0	35.9	36.8	12.4	11.4	27.0	35.9
	M193						22.9	33.5	41.8	13.6	13.3	22.9	33.5
XM16E1	M193						33.6	27.8	50.0	15.8	14.1	33.6	27.8
	M193						29.0	28.3	41.4	13.7	15.3	29.0	28.3
M14	M80	23.6	38.4				50.7	26.3				50.7	26.3
	M198*												

LEGEND: \* - Lead projectile only

- AV - Average
- AZ - Average number of rounds for zero
- SC - Score (Maximum possible - 50)
- ES - Extreme Spread (inches)
- MR - Mean Radius (inches)
- OS - Offset (inches)

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TABLE 4-2  
SIGHTS, LIMITED VISIBILITY - RIFLES  
Average Hits Per Firer

WEAPON	D U S K									
	50-METER TARGETS					75-METER TARGETS				
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	TOTAL
M14	8.7	7.6	12.1	5.3	3.8	5.4	14.0	11.4	17.5	
S-R	8.2	9.6	--	4.8	5.1	--	13.0	14.7	--	
XM16E1	8.9	8.8	--	4.2	5.1	--	13.1	13.9	--	
H-R	8.9	7.4	--	6.7	3.5	--	15.6	10.9	--	
A-R	9.0	6.6	--	5.6	3.9	--	14.6	10.4	--	
WEAPON	A R T I F I C I A L I L L U M I N A T I O N									
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	TOTAL
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	TOTAL
M14	7.9	8.1	11.7	6.4	6.7	9.6	14.3	14.8	21.3	
S-R	8.5	9.1	--	6.0	7.9	--	14.5	17.0	--	
XM16E1	6.6	8.1	--	4.4	7.1	--	11.0	15.2	--	
H-R	7.0	8.5	--	7.8	7.9	--	14.8	16.4	--	
A-R	5.9	7.8	--	5.7	7.4	--	11.6	15.2	--	

LEGEND: \* - Both projectiles scored

MAXIMUM HITS: Ball and Tracer - 10 hits per range  
Duplex - 20 hits per range

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TABLE 4-3  
SIGHTS, DAY - CARBINES

WEAPON	AMMO	100 METERS						250 METERS					
		AV			AV			AV			AV		
		AZ	SC	ES	AV	MR	OS	AZ	SC	ES	AV	MR	OS
M14	M80	5.9	48.3	13.9	3.9	4.5		14.7	41.6	21.3	6.5	4.9	
	M198*	5.0	48.2	15.2	5.0	6.7		15.5	39.2	32.2	11.2	9.5	
S-C	M193	4.8	48.5	8.3	2.5	3.5		13.8	41.7	18.4	5.7	6.3	
C-SMG	M193	7.5	48.4	12.7	3.9	3.6		12.0	38.6	30.1	9.7	7.2	
M14		400 YARDS						600 YARDS					
	M80	14.9	42.8	35.3	11.5	9.2		16.5	34.3	22.9	9.1	9.2	
	M198*	11.5	42.7	42.6	14.5	12.4							
	M193	12.3	43.2	27.9	9.1	10.8		22.4	23.3	39.0	14.6	15.7	
C-SMG	M193	13.6	36.8	45.1	14.8	10.8							
M14		800 YARDS						1000 YARDS					
	M80	19.8	30.8					24.2	29.4				

LEGEND: \* - Lead projectile only  
 AV - Average  
 AZ - Average number of rounds for zero  
 SC - Score (Maximum possible - 50)  
 ES - Extreme Spread (inches)  
 MR - Mean Radius (inches)  
 OS - Offset (inches)

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TABLE 4-4  
SIGHTS, LIMITED VISIBILITY - CARBINES  
Average Hits Per Firer

WEAPON	D U S K									
	50-METER TARGETS			75-METER TARGETS			TOTAL			
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	Duplex
M14	7.6	8.3	15.2	7.3	7.9	14.6	14.9	16.2	29.8	
S-C	7.3	7.7	--	6.7	7.4	--	14.0	15.1	--	
C-SMG	7.0	7.5	--	6.7	7.4	--	13.7	14.9	--	
WEAPON	A R T I F I C I A L I L L U M I N A T I O N									
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	Duplex
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	Duplex
M14	7.3	8.1	15.5	6.9	8.2	15.3	14.2	16.3	30.8	
S-C	7.0	7.5	--	7.3	7.9	--	14.3	15.4	--	
C-SMG	6.1	7.3	--	5.5	7.4	--	11.6	14.7	--	

LEGEND: \* - Both projectiles scored.  
MAXIMUM HITS: Ball and Tracer - 10 hits per range  
Duplex - 20 hits per range

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## 2.4.3.3 (C) Automatic Rifles (U)

2.4.3.3.1 (C) The M14E2 rear sight had positive settings and appropriate visual scales for determining zero. It did not require a special tool for adjustment. However, the combination tool was required for calibration of the elevation knob after a zero was obtained (Figure 17, Appendix V).

2.4.3.3.2 (C) The C-AR and S-AR front sights were stamped to indicate the direction for movement of the point of impact of the round. The front sights had positive settings, but did not have appropriate visual scales for determining zero. A special tool or a cartridge was required for adjustment of the front sight. The C-AR rear sight assembly provided short or long range settings and windage adjustments. When the S-AR was zeroed, provided the rear sight was calibrated, all subsequent elevation adjustments could be made on the rear sight. The C-AR and S-AR rear sights had positive settings and appropriate visual scales for adjusting windage.

2.4.3.3.3 (C) The C-AR and S-AR front sight post could be elevated to the point where the front sight detent would come out of its recess. In addition, the rotating sight post could be unscrewed completely from its recess.

2.4.3.3.4 (C) The S-AR elevation adjustment knob did not provide for rapid indexing of the range on the rear sight, but rather required an excessive number of turns of the knob to make a large change in elevation.

2.4.3.3.5 (C) Due to the fact the sights of the S-AR were offset to the left, it was more difficult to instruct firers in the principles of zeroing. When zeroing at 25 meters, account must be taken of the fact that if an offset center of impact on the 25-meter zeroing target is not used, an error in windage will be introduced at ranges greater than 25 meters; this error varies in direct proportion to the range, resulting in a significant error at ranges in excess of 350 meters. The center of impact on the 25-meter zeroing target should be offset to the right of the point of aim, by a distance slightly less than the offset of the front sight.

2.4.3.3.6 (C) The S-AR elevation scale did not coincide with the adjustment notches in the rear sight elevation adjustment knob. This made it impossible for the firer to accurately match the index line on his rear sight aperture with the range scale.

2.4.3.3.7 (C) No elevation rule could be established for the S-AR to predict the movement of the strike of a bullet in terms of range and clicks of elevation, because each click on the elevation scale moved the rear sight the same vertical increment for all ranges indexed on the scale. A different rule will be necessary at each range.

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2.4.3.3.8 (C) The M14E2 sight had sight settings and adjustments to achieve accuracy up to and including 1,000 yards. The C-AR and S-AR had sight settings and adjustments to achieve accuracy up to and including 600 yards. However, the C-AR was zeroed at 800 yards by five of ten firers. The S-AR, which had an adjustable scale to 1,000 meters, was zeroed by only two of ten firers at 800 yards, and by only one firer at 1,000 yards.

2.4.3.3.9 (C) The relative accuracy achieved with the candidate automatic rifles and their sights is indicated in Table 4-5.

2.4.3.3.10 (C) The relative accuracy achieved with the candidate automatic rifles and their sights during periods of limited visibility is indicated in Table 4-6.

2.4.3.3.11 (C) The results of the sight calibration verification exercise are indicated in Table 4-7.

2.4.3.3.12 (C) It was the opinion of the test officer who tested the Night Vision Weaponsight that suitable brackets for the use of night sighting devices could be fabricated for all of the candidate automatic rifles. The position of the magazine on top of the S-AR would necessitate offsetting the night sight device.

2.4.3.3.13. (C) No significant difficulty was encountered in aligning the candidate automatic rifles on targets at dusk or at night under artificial illumination.

### 2.4.3.4 (C) Machine Guns (U)

2.4.3.4.1 (C) The results of firing ten M60-LMG's and 10 M60-MMG's in the exercises described in paragraph 2.4.2.2.1 were totaled since the sight systems were identical. The results of firing ten S-LMG's and ten S-MMG's were totaled since the sight systems were identical. The results of firing are listed in Table 4-8.

2.4.3.4.2 (C) The results of firing the candidate machine guns at night and firing with artificial illumination are listed in Tables 7-15 and 7-16, Sub-Test No 7, Defense, Day and Night.

2.4.3.4.3 (C) Examination of the candidate machine gun sight systems revealed the characteristics listed in Table 4-9. The sights of the M60 machine guns required no tools for adjustment. The front sight post of the Code S machine guns required the use of a cartridge or combination tool for adjustment. It was easier to adjust the front sight post with the combination tool than with a cartridge.

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TABLE 4-5  
SIGHTS, DAY - AUTOMATIC RIFLES

WEAPON	AMMO	250 METERS						400 YARDS					
		AZ	AV	SC	ES	MR	OS	AZ	AV	SC	ES	MR	OS
M14E2	M80	20.6	31.9	22.2	22.2	6.3	9.9	15.9	37.6	32.5	9.9	10.8	
	M198*	14.8	33.3	28.0	8.8	8.1	8.1	9.3	37.2	29.6	9.9	14.2	
C-AR	M193	16.1	39.5	18.7	5.9	7.5	7.5	16.8	40.0	27.0	8.6	10.1	
S-AR	M193	16.2	30.9	26.6	8.7	9.2	9.2	10.2	27.2	47.1	14.6	11.5	
WEAPON	AMMO	600 YARDS						800 YARDS					
		AZ	AV	SC	ES	MR	OS	AZ	AV	SC	ES	MR	OS
M14E2	M80	14.2	21.3	43.5	14.1	19.1	19.1	26.0	39.9				
	M198*	23.2	33.5	37.3	14.8	17.7	17.7						
C-AR	M193	17.3	22.8	27.6	9.4	14.5	14.5						
S-AR	M193	29.1	20.8	45.4	16.4	18.5	18.5						
WEAPON	AMMO	1000 YARDS											
		AZ	AV	SC	ES	MR	OS						
M14E2	M80	20.1	35.3										

LEGEND: \* - Lead projectile only  
 AV - Average  
 AZ - Average number of rounds for zero  
 SC - Score (Maximum possible - 50)  
 ES - Extreme Spread (inches)  
 MR - Mean Radius (inches)  
 OS - Offset (inches)

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TABLE 4-6  
SIGHTS, LIMITED VISIBILITY - AUTOMATIC RIFLES  
Average Hits Per Firer

WEAPON	D U S K									
	50-METER TARGETS			75-METER TARGETS			TOTAL			
	Ball	Tracer	Duplex*	Ball	Tracer	Duplex	Ball	Tracer	Duplex	Duplex
M14E2	10	9.7	19.7	9.9	9.2	16.5	19.9	18.9	36.2	
C-AR	9.5	9.9	--	9.3	9.9	--	18.8	19.8	--	
S-AR	9.6	9.8	--	7.8	6.7	--	17.4	16.5	--	
ARTIFICIAL ILLUMINATION										
M14E2	8.4	6.6	17.8	5.9	6.4	15.7	14.3	13.0	33.5	
C-AR	7.4	8.6	--	5.8	7.4	--	13.2	16.0	--	
S-AR	6.5	6.5	--	3.4	5.4	--	9.9	11.9	--	

LEGEND: \* - Both projectiles scored.

MAXIMUM HITS: Ball and Tracer - 10 hits per range  
Duplex - 20 hits per range

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TABLE 4-8

## SIGHT EXERCISES - MACHINE GUNS

M60	EXERCISE NO 1				EXERCISE NO 2			
RANGE	Tgt Hits	Tgts Hit	HC	PTH	Tgt Hits	Tgts Hit	HC	PTH
200	205	45	34.1	28.1	281	52	46.8	32.5
500	129	46	21.1	28.8	171	61	28.5	38.1
800	51	36	8.3	22.5	90	55	15.0	34.4
1000	42	34	7.0	21.5	66	46	11.0	28.8
AVG	107	40.3	17.8	25.2	152	53.5	25.3	33.4
CODE S								
200	163	35	27.1	21.9	246	44	41.0	27.5
500	131	53	21.8	33.1	174	64	29.0	40.0
800	43	32	7.1	20.0	86	56	14.3	35.0
1000	16	14	2.6	8.8	37	25	6.1	15.6
AVG	88.3	33.5	14.7	20.9	136	47.3	22.6	29.5

LEGEND: HC - Hit Capability  
 HP - Hit Probability  
 PTH - Percent of Targets Hit

TABLE 4-9

## SIGHT CHARACTERISTICS - MACHINE GUNS

CHARACTERISTICS	M60	CODE S
Rear Sight	Open	Peep
Front Sight	Fixed	Adjustable
Range Scale	300-1100 meters Adjustable	200-1000 meters Fixed
Quick Change Rear Sight Slide	Yes	No
Windage Adjustment	8 Clicks not Always Centered on Index Line	38 Clicks not Always Centered on Index Line

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2.4.3.4.4 (C) When questioned as to their preference of a peep rear sight as on the Code S machine guns (ref Fig 20, App V), or an open rear sight as on the M60 machine guns (ref Fig 21, App V), 10 test soldiers indicated a preference for the open rear sight and one test soldier indicated a preference for a peep rear sight. The 10 test soldiers gave the following as reasons for their preference of the open sight:

a. Easier to align and adjust fire on the target during conditions of limited visibility.

b. Easier to see feedback effects during all conditions of visibility.

c. Clear picture of the target.

One test soldier stated he could obtain a more accurate sight picture with the peep sight on the Code S machine gun.

2.4.3.4.5 (C) When questioned as to their preference of the sight system on the Code S machine guns or the sight system on the M60 machine guns, ten test soldiers preferred the M60 sight system and one test soldier preferred the Code S sight system. Reasons given for preference of the M60 sight system were as follows:

a. All sight adjustments can be made on the rear sight.

b. Range adjustments can be made quickly with rear sight slide.

c. Easier to see through open-type rear sight.

Reason given for preference of the Code S sight system was that the one man preferred the peep sight on the Code S rather than the open sight of the M60.

2.4.3.4.6 (C) The Code S elevation adjustment knob did not provide for rapid indexing of the range on the rear sight, but rather required an excessive number of turns of the knob to make a large change in elevation.

2.4.3.4.7 (C) The aluminum range scale on 21 of the 25 M60 machine guns provided for test bent during use (ref Fig 84, App V).

2.4.3.4.8 (C) The Code S front sight post could be elevated to the point where the front sight detent would come out of its recess. In addition, the rotating sight post could be unscrewed completely from its recess.

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2.4.3.4.9 (C) It was the opinion of the test officer who tested the Night Vision Weaponsight that suitable brackets for the use of night sighting devices could be fabricated for all of the candidate machine guns.

2.4.3.4.10 (C) The results of zeroing two barrels in 12 of each type candidate machine gun are listed in Table 4-10. The number of clicks of elevation on the rear sight of the M60 machine guns and on the front sight of the Code S machine guns were recorded.

TABLE 4-10

DIFFERENCE IN ZERO BETWEEN BARREL 1 AND BARREL 2 (Clicks)

WEAPON	ELEVATION			WINDAGE		
	Maximum	Minimum	Average	Maximum	Minimum	Average
M60	15	0	2.7	4	0	.83
Code S	12	0	2.3	4	0	1.63

2.4.3.4.11 (C) The average times required for ten test soldiers to change both hot and cold barrels in the candidate machine guns are listed in Table 4-11.

TABLE 4-11

TIME TO CHANGE MACHINE GUN BARRELS (Seconds)

	M60-LMG	M60-MMG	S-LMG	S-MMG
Cold Barrel	8.7	7.5	15.1	11.3
Hot Barrel w/o Gloves	10.2	8.5	15.5	11.8
Hot Barrel w/Gloves	8.0	8.3	14.6	10.9

2.4.4 (C) ANALYSIS (U)

2.4.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.4.4.1.1 (C) It was not possible to determine standard sight settings or adjustments to achieve best accuracy results due to the variation at each range in sight settings between the candidate rifles, carbines, and automatic rifles of the same type.

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2.4.4.1.2 (C) All candidate rifles, carbines, and automatic rifles have the inherent capability to align on the target at night and during other conditions of limited visibility (to include artificial illumination), provided the target can be detected with the unaided eye.

2.4.4.1.3 (C) The M14 and M14E2 sight is significantly better than all the other candidate rifle, carbine, and automatic rifle sights. It is simple and has positive settings and appropriate visual scales for determining zero, not requiring special tools for adjustment. The other weapon candidates do not have appropriate visual scales for determining zero, and require a tool or cartridge for sight adjustments.

2.4.4.1.4 (C) With respect to durability, all the other candidate rifle, carbine, and automatic rifle sights were more durable than the M14 and M14E2 sights (ref Sub-Test No 16, Durability and Reliability).

2.4.4.1.5 (C) The lack of a stop to prevent the front sight posts and the front sight detents of all the candidate weapon sights, except M14 and M14E2, from falling out of their recess is undesirable.

### 2.4.4.2 (C) Machine Guns (U)

2.4.4.2.1 (C) It was not possible to determine standard sight settings or adjustments to achieve best accuracy results, due to the variation at each range in sight settings between the machine gun candidates of the same type.

2.4.4.2.2 (C) All candidate machine guns have the inherent capability to align on the target at night and other conditions of limited visibility (to include artificial illumination), provided the target can be detected with the unaided eye. The M60 sight is superior to the Code S sight in limited visibility, because of the small aperture in the peep sight of the Code S machine gun, which made it difficult for test soldiers to align on the target.

2.4.4.2.3 (C) The M60 sight is significantly better than the other candidate machine gun. It is simple, has positive settings and appropriate visual scales for determining zero, not requiring special tools for adjustment. The Code S machine gun does not have appropriate visual scales for determining zero, and requires a tool or cartridge for sight adjustments.

2.4.4.2.4 (C) With respect to durability, the Code S machine gun sights were significantly better than the M60 sight.

2.4.4.2.5 (C) The lack of a stop to prevent the front sight post and the front sight detent of the Code S machine gun from falling out of their recess is undesirable.

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2.4.4.3 (C) Shortcomings of the Candidate Weapon Sights (U)

2.4.4.3.1 (C) S-R and S-C:

- a. Do not have appropriate visual scale for determining zero.
- b. Require a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).

2.4.4.3.2 (C) XM16E1 and C-SMG:

- a. Do not have appropriate visual scale for determining zero.
- b. Require a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).

2.4.4.3.3 (C) H-R:

- a. Does not have appropriate visual scale for determining zero.
- b. Requires tools for rear sight adjustment.
- c. Sights not operable with a minimum of motion.

2.4.4.3.4 (C) A-R:

- a. Does not have appropriate visual scale for determining zero.
- b. Requires a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).

2.4.4.3.5 (C) C-AR:

- a. Does not have appropriate visual scale for determining zero.
- b. Requires a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).
- d. Lack of adjustability for elevation of the rear sight.

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## 2.4.4.3.6 (C) S-AR:

- a. Does not have appropriate visual scale for determining zero.
- b. Requires a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).
- d. Difficulty in making rapid large range adjustments on the rear sight.
- e. Impossibility of matching the index line with the range scale of the rear sight at all ranges.
- f. Left handed firers could not use the offset (to the left) sights.

## 2.4.4.3.7 (C) M60:

Adjustable range scale on rear sight lacks durability (ref Sub-Test No 16, Durability and Reliability).

## 2.4.4.3.8 (C) Code S:

- a. Does not have appropriate visual scale for determining zero.
- b. Requires a tool or cartridge for front sight adjustment.
- c. Sights are not operable with minimum motion (ref Sub-Test No 19, Human Factors Engineering).
- d. Difficulty in making rapid large range adjustments on the rear sight.
- e. The small aperture rear sight makes use of the sight difficult under low illumination conditions and restricts the gunner's field of view when engaging wide area targets.

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## 2.5 (C) SUB-TEST NO 5, MAGAZINES (U)

### 2.5.1 (C) OBJECTIVES (U)

#### Rifles, Carbines, and Automatic Rifles

##### Specific

#### 2.5.1.1 (C) To determine (ref para 3a(6), Part I, App III):

- a. The suitability of magazines with minimum of 50 rounds of point fire ammunition.
- b. The capability of loading the weapon (insertion of magazine) in one operation (from all firing positions) and recharging the magazine by use of a multiround charging device.

#### 2.5.1.2 (C) To evaluate (ref para 3a(6), Part I, App III):

- a. The maximum capacity permitted by other required characteristics.
- b. The suitability of magazines of lesser and greater capacities and use of factory-packed, expendable (discardable) magazines.

### 2.5.2 (C) METHOD (U)

#### Rifles, Carbines, and Automatic Rifles

Throughout all testing, data reflecting on the suitability of the magazines furnished with the candidate rifles and their ammunition were recorded. Particular attention was given to the determination of the following:

- a. Maximum and usable magazine capacity.
- b. Ease of loading the weapon.
- c. Ease of charging magazines on and off the weapon.
- d. Whether magazines were discardable or reusable.
- e. Suitability of multiround charging devices.

### 2.5.3 (C) RESULTS (U)

#### 2.5.3.1 (C) Rifles (U)

2.5.3.1.1 (C) None of the candidate rifles had a 50-round magazine capacity. The M14, XM16E1, A-R, and H-R candidate rifles had a magazine capacity of 20 rounds. The S-R rifle had a magazine capacity of 30 rounds.

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2.5.3.2.3 (C) M14 magazines could be charged when separate from or attached to the M14. S-C and C-SMG carbine magazines could be charged only when separate from the respective test carbines.

2.5.3.2.4 (C) Only the M14 had a multiround charging device for recharging magazines. This device was provided packed in the 7.62-mm ammunition. The magazine could be recharged, while in the M14, from 5-round clips. The 5.56-mm ammunition provided for the test did not contain a multiround charging device and none were provided for any of the 5.56-mm candidate carbines. However, subsequent to the completion of SAWS testing, a 5.56-mm charging device was tested and has been recommended for approval. None of the 5.56-mm candidate carbines provided for charging a magazine while loaded in the carbine.

2.5.3.2.5 (C) Since a magazine of only one capacity was furnished with each type candidate carbine, the effect of lesser or greater capacities could not be determined. Factory-packed or expendable magazines were not provided for test and could not be evaluated.

2.5.3.2.6 (C) There were fewer stoppages and malfunctions with the M14 which were attributed to the magazines than with the S-C and C-SMG.

2.5.3.2.7 (C) Bolt overrides and double feeds were experienced with the S-C and C-SMG. The magazine follower does not rise evenly within the magazine because the magazine spring slides on the magazine base, occasionally causing the round to be improperly indexed at the time the bolt begins its forward movement.

2.5.3.2.8 (C) It was discovered during testing that 21 rounds could be charged into M14E2 magazines, and that 31 rounds could be charged into both the S-C and C-SMG magazines. No apparent adverse effects resulted from overcharging the magazines. However, throughout all testing, test soldiers were cautioned against charging extra rounds in all magazines.

2.5.3.2.9 (C) Photographs of candidate carbine magazines appear in Figure 23, Appendix V.

### 2.5.3.3 (C) Automatic Rifles (U)

2.5.3.3.1 (C) None of the magazines of the candidate automatic rifles had a capacity of 50 rounds. The M14E2 magazine had a capacity of 20 rounds. The C-AR and the S-AR magazines had a capacity of 30 rounds each. An additional round could be inadvertently charged into each type of magazine. No apparent adverse effects resulted from overcharging the magazines. However, throughout all testing, test soldiers were cautioned against charging extra rounds in all magazines.

2.5.3.3.2 (C) All magazines locked firmly and easily in their respective automatic rifles in one operation from all firing positions.

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2.5.3.1.2 (C) The magazine could be loaded into all the candidate rifles with one operation from all firing positions. Only the M14 had a multi-round charging device for recharging magazines. This device was provided packed in the 7.62-mm ammunition. The magazine could be recharged, while in the rifle, from 5-round clips. The 5.56-mm ammunition provided for the test did not contain a multi-round charging device and none was provided for the 5.56-mm candidate rifles. However, subsequent to the completion of SAWS testing, a 5.56-mm charging device was tested and has been recommended for approval. None of the 5.56-mm candidate rifles provided for charging a magazine while loaded in the rifle.

2.5.3.1.3 (C) Since a magazine of only one capacity was furnished with each type candidate rifle, the effect of lesser or greater capacities could not be determined. Factory-packed or expendable magazines were not furnished for test and could not be evaluated.

2.5.3.1.4 (C) No difficulties were experienced with the M14 magazines and S-R magazines.

2.5.3.1.5 (C) A high incidence of bolt overrides and double feeds was experienced with the XM16E1 and A-R. The magazine follower does not rise evenly within the magazine because the magazine spring slides on the magazine base, occasionally causing the round to be improperly indexed at the time the bolt begins its forward movement.

2.5.3.1.6 (C) The condition described in 2.5.3.1.5 existed to a lesser degree with the H-R magazines.

2.5.3.1.7 (C) It was discovered during testing that 21 rounds could be charged into M14, XM16E1, A-R, and H-R magazines (20-round rated capacity) and that 31 rounds could be charged into the S-R magazines. No apparent adverse effects resulted from overcharging the magazines. However, throughout all testing, test soldiers were cautioned against charging extra rounds in all magazines.

2.5.3.1.8 (C) Photographs of the candidate rifle magazines appear in Figure 22, Appendix V.

### 2.5.3.2 (C) Carbines (U)

2.5.3.2.1 (C) None of the candidate carbines possessed a magazine capacity for 50 rounds. The M14 magazine capacity was 20 rounds and the S-C and C-SMG magazine capacity was 30 rounds.

2.5.3.2.2 (C) The M14 magazines locked firmly and easily into the M14 in one operation from all firing positions. S-C and C-SMG magazines seated easily in the respective weapons from all firing positions, but required firm upward hand pressure applied to the base of the magazines to insure proper locking in the test carbines.

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2.5.3.3.3 (C) Only the M14E2 had a multi-round charging device for re-charging magazines. The device was provided packed in the 7.62-mm ammunition. The magazine could be recharged in the M14E2 from 5-round clips. The 5.56-mm ammunition provided for the test did not contain a multi-round charging device and none were provided for any of the 5.56-mm candidate automatic rifles. However, subsequent to the completion of SAWS testing, a 5.56-mm charging device was tested and has been recommended for approval. None of the 5.56-mm candidate automatic rifles provided for charging a magazine while loaded in the automatic rifle.

2.5.3.3.4 (C) Throughout the conduct of Sub-Test No 7, Defense, Day and Night, and Sub-Test No 8, Assault, Day and Night, it was noted that long delays in firing resulted while the firers changed magazines. This was more pronounced with the M14E2 since it had a lesser magazine capacity than other weapons.

2.5.3.3.5 (C) No factory-packed, expendable (discardable) magazines were available to be tested with any of the candidate automatic rifles.

2.5.3.3.6 (C) Photographs of the magazines appear in Figure 23, Appendix V.

## 2.5.4 (C) ANALYSIS (U)

### 2.5.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.5.4.1.1 (C) With respect to the minimum magazine capacity of 50 rounds, all of the candidate weapons are unsuitable. Based upon magazine capacities, the 30-round S-R, S-C, C-SMG, S-AR, and C-AR magazines are more nearly suitable than the 20-round XM16E1, H-R, A-R, M14, and M14E2 magazines.

2.5.4.1.2 (C) All candidate weapons are suitable with respect to their capability for being loaded in one operation from all firing positions. A multi-round charging device is available for the 7.62-mm ammunition; a multi-round charging device with a 10-round clip for 5.56-mm ammunition has been recommended for approval but was not furnished for this test.

2.5.4.1.3 (C) With respect to maximum capacity permitted by other characteristics, it is believed that magazines of lesser capacity would be undesirable, and that magazines of greater capacities could be used satisfactorily with each of the candidate rifles, carbines, and automatic rifles, provided the magazine design is compatible with the weapon and it can be used from all firing positions.

2.5.4.1.4 (C) The lack of factory-packed expendable magazines is not a shortcoming or a deficiency, but it is the opinion of the Board that such magazines would be highly desirable for all of the candidate rifles, carbines, and automatic rifles.

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2.5.4.1.5 (C) In the opinion of the rifle and carbine test officers, poor functioning of the XM16E1, A-R, H-R, S-C, and C-SMG magazines contributes to the incidence of bolt overrides and double feeds with these weapons.

2.5.4.2 (C) Deficiency of the Candidate Weapons (U)

XM16E1, S-R, H-R, A-R, S-C, C-SMG, S-AR, and C-AR:

The lack of a multi-round charging device, which was not furnished with these candidate weapons.

2.5.4.3 (C) Shortcoming of the Candidate Weapons (U)

For all candidate weapons:

The lack of a 50-round minimum magazine capacity.

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## 2.6 (C) SUB-TEST NO 6, AMMUNITION AND PACKAGING (U)

### 2.6.1 (C) OBJECTIVES (U)

#### 2.6.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

Ammunition. To determine: (ref para 4b(4), Part I, App III):

- a. Tracer visibility under all light conditions.
- b. Tracer compatibility with night sighting devices.
- c. Tracer relative effectiveness as a means of target ranging and target/sector of fire designation.
- d. Tracer use in the engagement of moving targets at all ranges out to 1,000 meters.
- e. The relative hit probability with and without tracer (both day and night).
- f. Night tracer muzzle obscuration effects on the shooter and adjacent firers.

#### 2.6.1.2 (C) Machine Guns (U)

##### Specific

2.6.1.2.1 (C) Ammunition. To determine:

- a. Tracer visibility under all light conditions. (Ref para 2b(4), Part II, App III.)
- b. Tracer compatibility with night sighting devices. (Ref para 2b(4), Part II, App III.)
- c. Tracer effectiveness as a means of target ranging and engagement of moving ground targets at all ranges out to 1,500 meters. (Ref para 2b(4), Part II, App III.)
- d. Night tracer muzzle obscuration effects on firer and adjacent firers. (Ref para 2b(4), Part II, App III.)
- e. The number of tracer rounds required per firer controlled burst to produce most effective results. (Ref para 2b(4), Part II, App III.)

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f. The relative hit probability with and without tracer (both day and night). (Ref para 2b(4), Part II, App III.)

g. Availability and suitability of training aids such as blank ammunition and blank firing attachments/devices. (Ref para 8, Part II, App III.)

2.6.1.2.2 (C) Packaging. To evaluate (ref para 1a(6), Part II, App III):

a. Capacity, size, shape, and functioning of ammunition containers when firing from the bipod, sustained fire mount, and from hip/shoulder firing positions.

b. Ease of loading, feeding, unloading, and joining additional ammunition belts.

c. Means provided for recharging magazines, if appropriate.

2.6.2 (C) METHOD (U)

2.6.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.6.2.1.1 (C) Test soldiers were organized into 10-man squads all armed with either the rifle, carbine, or automatic rifle, within each 30-man test group (squads were matched insofar as possible). The candidate rifles, carbines, and automatic rifles were fired at stationary field-type targets located in the open and partially concealed, and at a moving target, using both ball and tracer ammunition under daylight conditions. The moving target was located at a range of 350 meters. The squad leader designated targets and sectors of fire by the use of ball and tracer fire. Stationary targets were located at representative ranges of 100, 200, 275, 350, 500, 600, 800, and 1,000 meters. Relative ease of designating targets and sectors of fire with and without tracer ammunition was determined.

2.6.2.1.2 (C) The compatibility of the tracer cartridge with night sighting devices was not determined since night sighting devices were not furnished for this test.

2.6.2.1.3 (C) Night tracer muzzle obscuration effects on the firer and adjacent firers were determined during Sub-Test No 7, Defense, Day and Night, and Sub-Test No 8, Assault, Day and Night. Firers were questioned concerning effects of muzzle flash and difficulties encountered with realigning the muzzle with the target from round to round.

2.6.2.1.4 (C) The relative hit probability with and without tracer ammunition was determined by the review and comparison of effectiveness obtained during Sub-Test No 7, Defense, Day and Night; and Sub-Test No 8, Assault, Day and Night.

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2.6.2.1.5 (C) Tracer visibility under all light conditions was determined during the conduct of Sub-Test No 7, Defense, Day and Night.

2.6.2.1.6 (C) Tracer use against moving targets was determined during the conduct of Sub-Test No 7, Defense, Day and Night.

2.6.2.1.7 (C) Experienced firers were used to fire all of the M14's, XM16E1's, and S-R's at a range of 100 meters using the ammunition designated for the SAWS test. One hundred M14's, 20 XM16E1's, and 20 S-R's were fired from the sandbag supported prone position at a Standard A-Type target. A 10-round shot group was fired with each rifle. Warming rounds were fired prior to firing for accuracy. The average extreme spread and average mean radius were determined for each rifle. (Ref 41, App I.)

2.6.2.1.8 (C) Five M14's were selected at random from the 100 rifles being used in this test and were fired, using the two lots of ammunition furnished for the SAWS tests, from a weapon cradle mount (machine rest). Three 10-round shot groups were fired with each lot of ammunition, and a match grade lot of ball ammunition known to be of good quality. Extreme spread and mean radius for each shot group were computed. (Ref 41, App I.)

2.6.2.1.9 (C) Because of the extreme spreads resulting from the firing described in paragraphs 2.6.2.1.7 and 2.6.2.1.8, the SAWS ammunition, consisting of three lots of 7.62-mm, M80 (RA 5374, WRA 22386, and LC 12047); two lots of 7.62-mm, M198, duplex (RA 451 and RA 452); and one lot of 5.56-mm, M193 (WCC 6089) ammunition, was fired in a test barrel at a standard target at a range of 100 meters. Ten-round shot groups were fired at each of three targets with each lot of ammunition. The extreme spread and mean radius were computed for each shot group. For duplex ammunition, the impacts of first and second projectiles were identified, and a separate extreme spread and mean radius was computed for each. (Ref Table 6-5.)

## 2.6.2.2 (C) Machine Guns (U)

2.6.2.2.1 (C) During the conduct of Sub-Test No 7, Defense, Day and Night; and Sub-Test No 8, Assault, Day and Night, the relative effectiveness with and without tracer ammunition with the candidate machine guns was determined. Particular attention was given to determining the following:

a. Visibility of tracer under all light conditions encountered during testing.

b. Relative effectiveness as a means of target ranging out to 1,500 meters, and engagement of moving ground targets at a range of 350 meters.

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c. Night tracer muzzle obscuration effects on the firer and adjacent firers.

2.6.2.2.2 (C) During the conduct of Sub-Test No 7, Defense, Day and Night, the relative effectiveness with the candidate machine guns was determined.

2.6.2.2.3 (C) The suitability of blank ammunition and associated blank firing devices for the test machine guns was not determined since no blank 5.56-mm ammunition and no blank firing devices were provided for test.

2.6.2.2.4 (C) The compatibility of the tracer cartridge with night sighting devices was not determined since night sighting devices were not furnished for this test.

2.6.2.2.5 (C) During the conduct of all sub-tests, the capacity, size, shape, and functioning of ammunition containers for the candidate machine guns were evaluated when firing from the bipod, sustained fire mount, and from hip/shoulder firing positions. The capacity, size, and shape of all containers were measured. Any malfunctions or stoppages of the candidate machine guns which could be attributed to the ammunition containers or links were recorded.

2.6.2.2.6 (C) During the conduct of all sub-tests, any difficulties encountered in loading, feeding, unloading, and joining additional ammunition belts were recorded.

2.6.2.2.7 (C) The means of recharging magazines were not evaluated since none of the candidate machine guns were capable of accepting a magazine.

2.6.3 (C) RESULTS (U)

2.6.3.1 (C) Rifles (U)

2.6.3.1.1 (C) Test soldiers and test personnel stated that during the conduct of Sub-Test No 7, Defense, Day and Night, the tracer was visible under all light conditions out to approximately 800 meters.

2.6.3.1.2 (C) Test soldiers and test personnel reported that tracer ammunition was much more effective in designating targets and sectors of fire than the other types of ammunition used. When questioned, they stated that the degree of feedback was significantly greater with 7.62-mm ammunition than with 5.56-mm ammunition out to 800 meters. Beyond 800 meters the degree of feedback with 7.62-mm and 5.56-mm ammunition diminished rapidly to a point of insignificance.

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2.6.3.1.3 (C) The effect of tracer ammunition against the moving target located at 350 meters in Sub-Test No 7, Defense, Day and Night, compared to the effect achieved with other types of ammunition is reflected in Table 6-1.

2.6.3.1.4 (C) The relative hit probability with and without tracer (both day and night) is reflected in Table 6-2. The hit probabilities (day and night, semiautomatic and automatic) obtained in Sub-Test No 7, Defense, Day and Night; and Sub-Test No 8, Assault, Day and Night, have been combined to obtain total values.

2.6.3.1.5 (C) Muzzle obscuration effects of tracer ammunition on the firer and adjacent firers were determined by questioning the firers in each group. Firers stated that there was little difference in muzzle obscuration between candidate weapons, and that the muzzle was not obscured by any candidate weapon firing.

2.6.3.1.6 (C) Results of prone sandbag-supported firing outlined in paragraph 2.6.2.1.7 are reflected in Table 6-3.

2.6.3.1.7 (C) Results of machine rest firing outlined in paragraph 2.6.2.1.8 are reflected in Table 6-4.

2.6.3.1.8 (C) Results of accuracy test barrel firing described in paragraph 2.6.2.1.9 are reflected in Table 6-5.

### 2.6.3.2 (C) Carbines (U)

2.6.3.2.1 (C) Test soldiers and test personnel stated that during the conduct of Sub-Test No 7, Defense, Day and Night, the tracer element was visible under all light conditions out to a distance of approximately 800 meters.

2.6.3.2.2 (C) Test soldiers and test personnel reported that tracer ammunition was much more effective in designating targets and sectors of fire than the other types of ammunition used. When questioned, they stated that the degree of feedback was significantly greater with 7.62-mm ammunition than with 5.56-mm ammunition out to 800 meters. Beyond 800 meters the degree of feedback with 7.62-mm and 5.56-mm ammunition diminished rapidly to a point of insignificance.

2.6.3.2.3 (C) The effect of tracer ammunition against the moving target located at 350 meters in Sub-Test No 7, Defense, Day and Night, compared to the effect achieved with other types of ammunition is reflected in Table 6-6.

2.6.3.2.4 (C) The relative hit probability with and without tracer, both day and night, is indicated in Table 6-7.

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TABLE 6-1

TRACER COMPARISON - MOVING TARGET - 350 METERS  
RIFLES

WEAPON	TGT HITS		TGT HITS		TGT HITS DUPLEX					
	"B"		"T"		"1"		"2"		TOTAL HITS	
	S/A	F/A	S/A	F/A	S/A	F/A	S/A	F/A	S/A	F/A
M14	21*	9.8*	10*	6.8	11.5*	7.7*	10.5*	3.2*	23.3*	10.5*
XM16E1	24	14	16	13						
A-R	12	4	16	7						
S-R	21	15	15	17						
H-R	0	7	18	7						

LEGEND: \* - Average of the Four Groups. B - Ball.  
1 - First Projectile. T - Tracer.  
2 - Second Projectile  
S/A - Semiautomatic Fire.  
F/A - Full Automatic Fire.

TABLE 6-2

AMMUNITION COMPARISON  
RIFLES

WEAPON	AMMO	D-A-Y				N-I-G-H-T			COM- BINED TOTAL
		SEMI-AUTOMATIC		AUTOMATIC	TOTAL	SEMI-AUTOMATIC		TOTAL	
		DEFENSE	ASSAULT	DEFENSE		DEFENSE	ASSAULT		
		HP	HP	HP		HP	HP		
M14	M80	2.9	2.7	2.4	8.0	3.2	1.3	4.5	
S-R	M193	2.6	1.5	2.2	6.3	2.2	0.9	3.1	
XM16E1	M193	3.0	2.4	2.6	8.0	3.4	1.4	4.8	
H-R	M193	2.8	4.3	2.0	9.1	2.5	1.5	4.0	
A-R	M193	2.9	1.9	2.4	7.2	3.7	1.3	5.0	
TOTAL					39.6			21.4	
AVERAGE (For all types Ball Ammunition)					7.9			4.3	12.2
M14	M62	3.0	2.3	2.4	7.7	4.0	1.3	5.3	
S-R	M196	1.8	1.7	2.3	5.8	2.3	1.9	4.2	
XM16E1	M196	2.9	2.1	2.6	7.6	3.6	1.1	4.7	
H-R	M196	2.7	2.3	2.2	7.2	4.2	1.3	5.5	
A-R	M196	3.2	2.2	2.8	8.2	4.2	1.5	5.7	
TOTAL					36.5			25.4	
AVERAGE (For all types Tracer Ammunition)					7.3			5.1	12.4
M14	M198	3.3	2.6	2.5	8.4	3.1	1.2	4.3	13.7

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TABLE 6-3

PRONE SANDBAG SUPPORTED FIRING - 100 METERS  
(Measurements in Inches)

WEAPON	EXTREME SPREAD (AV)	MEAN RADIUS (AV)
M14 (1)	11.6	3.7
XM16E1 (2)	9.1	3.1
S-R (2)	6.8	2.2
S-C (2)	7.1	2.2

LEGEND: AV - Average.  
(1) - 100 Weapons Used.  
(2) - 20 Weapons Used.

TABLE 6-4

MACHINE REST FIRING - M14 RIFLES - 100 METERS  
(Measurements in Inches)

RIFLE NO	LOT NO	TGT NO	ES	MR	RIFLE NO	LOT NO	TGT NO	ES	MR
336004	RA 5374	1	10.6	3.1	360277	RA 5374	1	8.1	2.2
		2	5.5	1.8			2	10.8	3.2
		3	9.5	3.2			3	12.6	3.0
336004	LC 12036	1	3.9	1.2	360277	LC 12036	1	4.4	1.6
		2	3.8	1.0			2	5.6	1.8
		3	4.0	1.2			3	6.1	1.6
336004	WRA 22386	1	8.2	2.8	360277	WRA 22386	1	8.2	2.5
		2	10.2	3.2			2	7.2	3.5
		3	9.1	3.1			3	6.9	2.5
363367	RA 5374	1	13.5	3.3	1278406	RA 5374	1	14.1	2.7
		2	9.5	2.2			2	7.8	2.7
		3	12.2	3.8			3	8.1	2.2
363367	LC 12036	1	5.6	1.8	1278406	LC 12036	1	6.0	1.6
		2	4.2	1.3			2	3.4	1.1
		3	3.0	1.0			3	4.8	1.3
363367	WRA 22386	1	12.5	3.2	1278406	WRA 22386	1	4.9	2.0
		2	9.8	3.3			2	5.8	1.7
		3	10.0	3.4			3	10.0	4.7
355524	RA 5374	1	8.8	3.1					
		2	7.1	1.8					
		3	7.1	2.4					
355524	LC 12036	1	4.5	1.4					
		2	5.1	1.5					
		3	4.4	1.5					
355524	WRA 22386	1	10.3	3.2					
		2	7.1	2.2					
		3	10.0	2.7					

LEGEND: ES - Extreme Spread.  
MR - Mean Radius

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TABLE 6-5

TEST BARREL FIRING - SAWS AMMUNITION  
(Measurements in Inches)

LOT NO	TGT NO	TYPE AMMO	EXTREME SPREAD		MEAN RADIUS	
			1	2	1	2
RA 451	1	M198	6.8	14.7	2.1	6.1
	2	M198	5.2	16.4	1.8	6.0
	3	M198	6.4	16.8	1.3	7.0
RA 452	1	M198	3.7	18.9	1.2	7.1
	2	M198	4.5	16.0	1.4	7.0
	3	M198	4.1	17.6	1.1	8.4
WCC 6089	1	M193	1.5		0.6	
	2	M193	1.8		0.5	
	3	M193	1.5		0.5	
WRA 22386	1	M80	3.3		1.0	
	2	M80	3.4		1.0	
	3	M80	3.3		1.0	
RA 5374	1	M80	4.9		1.5	
	2	M80	5.1		1.6	
	3	M80	4.6		1.5	
LC 12047 Match Ammo		M80	1.1		0.5	

LEGEND: 1 - First Projectile.  
2 - Second Projectile.

TABLE 6-6

TRACER COMPARISON - MOVING TARGET  
CARBINES  
(350 Meters)

WEAPON	TARGET HITS (B)		TARGET HITS (T)		TARGET HITS (DUPLEX)		TOTAL	
	S/A	F/A	S/A	F/A	S/A	F/A	S/A	F/A
M14	5	11	9	20	8	10	22	41
S-C	3	15	4	6			7	21
C-SMG	4	5	4	16			8	21

LEGEND: S/A - Semiautomatic Fire. B-Ball.  
F/A - Full Automatic Fire. T-Tracer.

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TABLE 6-7  
AMMUNITION COMPARISON  
CARBINES

WEAPON	AMMO	D A Y				N I G H T			COM- BINED TOTAL
		SEMIAUTOMATIC		AUTOMATIC	TOTAL	SEMIAUTOMATIC		TOTAL	
		DEFENSE HP	ASSAULT HP	DEFENSE HP		DEFENSE HP	ASSAULT HP		
M14	M80	2.8	2.3	1.6	6.7	2.5	1.1	3.6	
S-C	M193	2.9	1.4	1.2	5.5	2.3	0.6	2.9	
C-SMG	M193	1.8	1.4	1.1	4.3	1.7	0.7	2.4	
TOTAL					16.5			8.9	
AVERAGE					5.5			3.0	8.5
M14	M62	2.9	2.4	1.8	7.1	2.8	1.0	3.8	
S-C	M196	2.1	1.6	1.5	5.2	2.4	0.8	3.2	
C-SMG	M196	2.3	1.4	1.4	5.1	2.8	0.6	3.4	
TOTAL					17.4			10.4	
AVERAGE					5.8			3.5	9.3
M14	M198	2.3	2.2	2.3	6.8	2.5	0.9	3.4	10.2

2.6.3.2.5 (C) Muzzle obscuration effects of both ball and tracer ammunition upon the shooter and adjacent firers was determined by questioning the test firers. Test firers stated that the muzzle of the C-SMG was obscured whenever fired, either in the semiautomatic or automatic mode of fire. This obscuration caused loss of night vision. However, when using tracer ammunition it was easier to adjust fire on target through feedback than when using ball ammunition. There was little difference in muzzle obscuration between other candidate weapons. The muzzle was obscured only when firing the C-SMG.

## 2.6.3.3 (C) Automatic Rifles (U)

2.6.3.3.1 (C) Test soldiers and test personnel stated that during the conduct of Sub-Test No 7, Defense, Day and Night, the tracer was visible under all light conditions out to approximately 800 meters.

2.6.3.3.2 (C) Test soldiers and test personnel reported that tracer ammunition was much more effective in designating targets and sectors of fire than the other types of ammunition used. When questioned, they stated that the degree of feedback was significantly greater with 7.62-mm ammunition than with 5.56-mm ammunition out to 800 meters. Beyond 800 meters the degree of feedback with 7.62-mm and 5.56-mm ammunition diminished rapidly to a point of insignificance.

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2.6.3.3.3 (C) The results of tracer firing against moving targets are depicted in Table 6-8.

2.6.3.3.4 (C) The relative hit probabilities with and without tracer ammunition, both during the hours of daylight and during the hours of darkness, are depicted in Table 6-9.

2.6.3.3.5 (C) Upon being questioned, firers stated that the muzzle flash of the M14E2 firing M62 cartridges caused them to lose their night vision. They further stated that this muzzle flash made it difficult for them to realign the muzzle of the M14E2 with the target after each burst.

## 2.6.3.4 (C) Machine Guns (U)

2.6.3.4.1 (C) The tracer element of both the Cartridge, 7.62-mm, NATO, Tracer, M62 (M62), and the Cartridge, 5.56-mm, Tracer, M196 (M196), was visible during all light conditions encountered. There was no discernible difference between the intensity of the M62 and M196 tracer elements.

2.6.3.4.2 (C) Test soldiers and test personnel reported that tracer ammunition was much more effective in designating targets and sectors of fire than the other types of ammunition used. When questioned, they stated that the degree of feedback was significantly greater with 7.62-mm ammunition than with 5.56-mm ammunition out to 800 meters. Beyond 800 meters the degree of feedback with 7.62-mm and 5.56-mm ammunition diminished rapidly to a point of insignificance.

2.6.3.4.3 (C) The results of engaging moving ground targets are contained in Table 6-10.

2.6.3.4.4 (C) The muzzle blast from both the M62 and M196 ammunition produced some obscuration effects on the firer at night; however, the effects were not measurable. There was no significant difference between the effects produced by the M62 and the M196.

2.6.3.4.5 (C) The relative hit probability with and without tracer is reflected in Table 6-11.

2.6.3.4.6 (C) The plastic bandoleer for use with the Code-S machine guns was 6.75 x 2.75 x 5.20 inches in size and had a capacity of 150 rounds of 5.56-mm linked ammunition. The magazine assembly for use with the M60 machine guns was 8 x 3.5 x 6 inches in size and had a capacity for 100 rounds of 7.62-mm linked ammunition. No malfunctions or stoppages were attributed to the plastic bandoleer or magazine assembly. Ammunition in the plastic bandoleer had a tendency to rattle against the bandoleer when carried.

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TABLE 6-8

TRACER COMPARISON - MOVING TARGET - 350 METERS  
AUTOMATIC RIFLES

WEAPON	TARGET HITS				TARGET HITS DUPLEX					
	"B"		"T"		"1"		"2"		TOTAL HITS	
	S/A	F/A	S/A	F/A	S/A	F/A	S/A	F/A	S/A	F/A
M14E2	23	6	13	1	1	8	4	3	5	11
C-AR	28	9	13	16	-	-	-	-	-	--
S-AR	--	7	--	32	-	-	-	-	-	--

LEGEND: 1 - First Projectile.      B - Ball.  
2 - Second Projectile.      T - Tracer.  
S/A - Semiautomatic Fire.  
F/A - Full Automatic Fire.

TABLE 6-9

AMMUNITION COMPARISON  
AUTOMATIC RIFLES

WEAPON	AMMO	D A Y			N I G H T			COM- BINED TOTAL
		HIT PROBABILITY			HIT PROBABILITY			
		DEFENSE	ASSAULT	TOTAL	DEFENSE	ASSAULT	TOTAL	
M14E2	M80	2.5	2.8	5.3	5.4	3.1	8.5	
C-AR	M193	2.0	2.6	4.6	3.8	2.9	6.7	
S-AR	M193	2.1	2.4	4.5	2.9	2.4	5.3	
TOTAL		6.6	7.8	14.4	12.1	8.4	20.5	
AVERAGE				*4.8			*6.8	11.6
M14E2	M62	2.9	3.2	6.1	5.5	3.1	8.6	
C-AR	M196	1.9	2.8	4.7	4.9	3.7	8.6	
S-AR	M196	3.4	2.7	6.1	5.3	3.3	8.6	
TOTAL		8.2	8.7	16.9	15.7	10.1	25.8	
AVERAGE				*5.6			*8.6	14.2
M14E2	M198	3.2	3.1	*6.3	5.2	2.8	*8.0	14.3

\* Average of a single type of ammunition.

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TABLE 6-10  
MOVING TARGET - MACHINE GUNS

WEAPON	TARGET HITS	TARGET HITS	
	4 Ball: 1 Tracer	4 Duplex: 1 Tracer	
M60 *	19	15 <sup>(1)</sup>	13 <sup>(2)</sup>
Code-S **	15	--	--

LEGEND: \* Average of M60-MMG and M60 LMG.  
 \*\* Average of S-MMG and S-LMG.  
 (1) First Projectile.  
 (2) Second Projectile.

TABLE 6-11  
AMMUNITION COMPARISON  
MACHINE GUNS

WEAPON	AMMO	D A Y			N I G H T			COM- BINED TOTAL
		HIT PROBABILITY			HIT PROBABILITY			
		DEFENSE	ASSAULT	TOTAL	DEFENSE	ASSAULT	TOTAL	
M60	4M80: 1M62	2.8	2.7	5.5	3.0	2.9	5.9	
Code-S	4 M193: 1 M196	2.8	2.5	5.3	2.4	3.4	5.8	
TOTAL		5.6	5.2	10.8	5.4	6.3	11.7	
AVERAGE				5.4			5.9	11.3
M60	M62	-	-	-	2.8	3.5	6.3	
Code-S	M196	-	-	-	2.6	3.3	5.9	
TOTAL		-	-	-	5.4	6.8	12.2	
AVERAGE							6.1	--
M60	4 M198: 1 M193	2.9	3.5	6.4	3.3	3.3	6.6	13.0

NOTE: All tracer was not fired during day exercises.

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2.6.3.4.7 (C) Approximately 10 percent of the failures to feed with Code-S machine guns were caused by links not being ejected, thus preventing the bolt from going forward (ref Sub-Test No 16, Durability and Reliability). No difficulties were encountered in loading, unloading, and joining additional ammunition belts.

## 2.6.4 (C) ANALYSIS (U)

### 2.6.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.6.4.1.1 (C) Tracer elements of both 7.62-mm and 5.56-mm tracer ammunition are satisfactorily visible under all light conditions.

2.6.4.1.2 (C) Tracer ammunition is significantly more effective as a means of target ranging and target/sector of fire designation than ball and duplex ammunition. The 7.62-mm ball and duplex ammunition provides more impact feedback than 5.56-mm ammunition.

2.6.4.1.3 (C) There was an insufficient number of hits on the moving target on which to base a valid conclusion as to the comparative effectiveness of tracer ammunition.

2.6.4.1.4 (C) With respect to relative hit probability with and without tracer (day and night), tracer ammunition is more effective at night than other types of ammunition used (ref Tables 7-3, 7-7, 7-11). However, there is a significant increase in hit capability during daylight with duplex ammunition at the shorter ranges (ref Charts 7-1 to 7-5; 7-8 to 7-11; 7-17 to 7-19; 7-24 and 7-25; 7-33 to 7-35; 7-43 to 7-46; 7-56 and 7-57; 7-63 to 7-68).

2.6.4.1.5 (C) All of the candidate weapons were satisfactory with respect to night muzzle obscuration effects on the test soldiers, except the C-SMG firing both ball and tracer ammunition, and the M14E2 firing tracer ammunition. Additional testing indicates the use of CR propellant in 5.56-mm ball ammunition reduces the muzzle flash of the C-SMG (ref Sub-Test No 11, Signature Characteristics; and Sub-Test No 19, Human Factors Engineering).

### 2.6.4.2 (C) Machine Guns (U)

2.6.4.2.1 (C) Tracer elements of both 7.62-mm and 5.56-mm tracer ammunition are satisfactorily visible under all light conditions.

2.6.4.2.2 (C) Tracer ammunition is significantly more effective as a means of target ranging and target/sector of fire designation than ball and duplex ammunition. The 7.62-mm ball and duplex ammunition provides more impact feedback than 5.56-mm ammunition.

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2.6.4.2.3 (C) There was an insufficient number of hits on the moving target on which to base a valid conclusion as to the effectiveness of tracer ammunition.

2.6.4.2.4 (C) There is no significant difference between candidate machine guns or types of tracer ammunition used with respect to muzzle obscuration effects on the firer and adjacent firers.

2.6.4.2.5 (C) The number of tracer rounds per firer-controlled burst to produce most effective results was not determined; however, in the opinion of the test officer, one tracer round per burst was needed for target ranging, particularly at longer ranges.

2.6.4.2.6 (C) With respect to relative hit probability, with and without tracer (day and night), all tracer ammunition was not fired during the day exercises and all ball was not fired during either exercises. There was a significant increase in hit capability with 4 duplex-1 tracer ammunition mix at the shorter ranges (ref Charts 7-71 to 7-73, and 7-75).

2.6.4.2.7 (C) The plastic bandoleer for use with Code-S machine guns and the magazine assembly for use with M60 machine guns were satisfactory with respect to capacity, size, shape, and functioning when firing from the bipod sustained fire mount, and from hip/shoulder firing positions. The plastic bandoleer was smaller than the M60 magazine assembly but had a larger capacity due to the smaller size of 5.56-mm ammunition.

2.6.4.2.8 (C) The ease of loading, feeding, unloading, and joining additional ammunition was satisfactory and comparable with both 7.62-mm and 5.56-mm ammunition.

## 2.6.4.3 (C) Deficiency of the Candidate Weapon (U)

C-SMG:

Excessive muzzle flash with ball and tracer ammunition.

## 2.6.4.4 (C) Shortcoming of the Candidate Weapon (U)

M14E2:

Excessive muzzle flash with tracer ammunition.

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### 2.7 (C) SUB-TEST NO 7, DEFENSE, DAY AND NIGHT (U)

#### 2.7.1 (C) OBJECTIVES (U)

##### 2.7.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

###### Specific

2.7.1.1.1 (C) To determine (ref para 4b(6)(c), Part I, App III):

a. Effects against targets in tactical disposition (concealed and in emplacements) at all ranges out to 1,000 meters.

b. Effectiveness of area or suppressive fire at the longer ranges, 600 to 1,000 meters.

c. Effects of engagement of stationary and moving ground targets out to ranges of 1,000 meters.

d. Effectiveness in terms of hits per rounds fired, pounds of ammunition/weapon, trigger pulls, unit of time, modes of fire, rates of fire, and types of ammunition used.

2.7.1.1.2 (C) To evaluate the effects of feedback fire adjustment information from bullet strike in the target area (ref para 4b(6)(f), Part I, App III).

##### 2.7.1.2 (C) Machine Guns (U)

###### Specific

2.7.1.2.1 (C) To determine the relative effectiveness and accuracy of the candidate machine guns against the following types of target situations (ref para 2b(6), Part II, App III):

a. Day and night defense targets in tactical disposition (concealed and in emplacements) at ranges out to 1,500 meters.

b. Area targets and area suppressive fires at the longer ranges (beyond 500 meters).

c. The engagement of moving ground targets at ranges out to 1,500 meters.

2.7.1.2.2 (C) To evaluate the effects of feedback fire adjustment information from bullet strike in the target area.

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### 2.7.2 (C) METHOD (U)

#### 2.7.2.1 (C) Rifles and Carbines (U)

2.7.2.1.1 (C) Test soldiers were organized into 10-man squads armed either with the rifle or carbine within each 30-man test group (squads were matched insofar as possible). The candidate rifles or carbines were fired by the three squads over a representative day defense type course containing short exposure time (pop-up) targets arranged in various formations and placed at various ranges out to 1,000 meters; targets concealed and emplaced at various ranges out to 1,000 meters; and a moving target. Short exposure time targets were grouped in realistic personnel-type formations located at ranges of 100, 200, 275, 350, 500, 600, 800, and 1,000 meters. Targets at 200, 275, 350, and 500 meters were programmed for an exposure time of 6 seconds. The 100-meter targets were programmed for an exposure time of 4 seconds. A moving personnel-type target was located at a range of 350 meters which was programmed to appear when the personnel-type formation targets were presented at 350 meters. The targets at 600, 800, and 1,000 meters were stationary "M"-type targets. A linear personnel target with witness panels was located at 500 and 600 meters. The course was fired using ball, tracer, and duplex ammunition in the semiautomatic and full automatic modes of fire. Exposure time of targets, rounds fired, times to fire, targets hit, and target hits were recorded. Relative effectiveness of each type candidate rifle and carbine was determined against each type target (personnel grouped, targets moving) in terms of hit capability, hit probability, and percent of targets hit. During this and other sub-tests, the degree of feedback was observed with each type ammunition. The effect of suppressive fire was recorded by the number of hits within the target area (on witness panels) of the linear personnel targets (Figures 4 and 5, Appendix VII).

2.7.2.1.2 (C) Effectiveness in hits per trigger pull in the automatic mode of fire could not be determined because the instrumentation did not have the capability of recording the number of rounds per firer in each burst.

2.7.2.1.3 (C) A squad night defensive exercise was conducted with squads organized as described in paragraph 2.7.2.1.1. Personnel-type short exposure time targets were utilized. Targets were programmed for equal exposure time for each rifle and carbine squad. Target hits, targets hit, and rounds fired were recorded. Hit capability, hit probability, and percent of targets hit were computed and compared (Figure 6, Appendix VII).

2.7.2.1.4 (C) Test soldiers were questioned concerning night tracer muzzle obscuration effects on the firer, and adjacent-firers, with the candidate rifles and carbines.

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### 2.7.2.2 (C) Automatic Rifles (U)

2.7.2.2.1 (C) Test soldiers were organized into pairs for employment similar to that in a rifle squad, and the candidate automatic rifles were fired over the day defense course described in paragraph 2.7.2.1.1. The course was fired using ball, tracer, and duplex ammunition in the automatic and semiautomatic modes from the bipod. Target exposure time, rounds fired, times to fire on each target, target hits, targets hit, and trigger pulls were recorded for each firer. Relative effectiveness against each type target (personnel grouped, targets emplaced, targets moving) in terms of hit capability, hit probability, and percent of targets hit was determined. The degree of feedback was observed with each type ammunition. The effect of suppressive fire was recorded by the number of hits within the target area (on witness panels) of the linear personnel targets.

2.7.2.2.2 (C) A night defensive exercise was conducted employing the candidate automatic rifles as they are presently employed in the rifle squad. Personnel-type, short exposure time targets were utilized. Targets were programmed for equal exposure time for each candidate automatic rifle. Target hits, targets hit, rounds fired, and trigger pulls were recorded. Hit capability, hit probability, and percent of targets hit were computed and compared (Figure 6, Appendix VII).

2.7.2.2.3 (C) The 10 test soldiers, organized as a 10-man squad, fired the candidate automatic rifles over the day defense course, using the semiautomatic and the automatic modes of fire, to provide a basis of comparison with the rifle candidates (Figures 4 and 5, Appendix VII).

2.7.2.2.4 (C) Test soldiers were questioned concerning night tracer muzzle obscuration effects on the firer and adjacent firers with all the candidate automatic rifles.

### 2.7.2.3 (C) Machine Guns (U)

2.7.2.3.1 (C) Ten test soldiers, firing in pairs, fired the candidate machine guns over the day defense course described in paragraph 2.7.2.1.1, using a 4-1 mix of ball and tracer, and a 4-1 mix of duplex and tracer ammunition. The sequence of firing was counter-balanced with that of the automatic rifles, and the same types of data were collected.

2.7.2.3.2 (C) Upon completion of the day defense exercise, each test soldier prepared range cards using the targets at 200, 275, 500, and 600 meters on the day defense course as reference points.

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During the hours of darkness the test soldiers, firing in pairs, engaged these targets using the techniques of predetermined fire. Fifty rounds each of tracer, 4-1 mix of ball and tracer, and 4-1 mix of duplex and tracer ammunition were used. In addition to the same data recorded during the day defense exercise, the time to shift from one target to another was recorded.

2.7.2.3.3 (C) The exercise described in paragraph 2.7.2.3.2 was repeated using 4-1 mix of ball and tracer ammunition under conditions of artificial illumination, except that test soldiers did not use the predetermined fire techniques, but attempted to aim and fire using the integral machine gun sights.

2.7.2.3.4 (C) During the conduct of this sub-test, specific attention was given to determining the following:

- a. Machine gun signature characteristics (smoke, flash, blast, and reflection).
- b. Capability to align on the target using artificial illumination.
- c. Visibility of trace of tracer ammunition.
- d. Relative effectiveness of tracer ammunition as a means of target ranging.
- e. Night tracer muzzle obscuration effects on the firer and adjacent firers.
- f. Effects of feedback from bullet strike in the target area on the firer's ability to adjust fire.

### 2.7.3 (C) RESULTS (U)

#### 2.7.3.1 (C) Rifles (U)

2.7.3.1.1 (C) The relative effectiveness of the candidate rifles against targets in tactical disposition in the day defense in terms of hits/rounds fired, pounds of ammunition/weapon, unit of time, modes of fire, existing rates of fire, trigger pulls (semiautomatic), and types of ammunition is reflected in Tables 7-1 and 7-2. Detailed results by range are indicated in Charts 7-1 through 7-14, Appendix II.

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TABLE 7-1  
DAY DEFENSE -- RIFLES  
SEMI-AUTOMATIC FIRE, SUMMARY OF ALL RANGES

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TCTS HIT	HP	PTH	H/PS**	H/S
M14	M80	10,128*	638	6.3	279	2.9	42.1	1.2	1.1
	M62	10,934*	610	5.6	319	3.0	47.8	1.1	1.1
	M198	10,464*	903	8.6	228	3.3	49.2	0.8	0.9
S-R	M193	3,796	193	5.1	95	2.6	56.9	2.0	1.3
	M196	3,538	133	3.8	61	1.8	37.4	1.5	0.3
	M193	2,777	199	7.2	79	3.0	47.7	2.8	1.4
H-R	M196	2,654	217	8.2	74	2.9	44.8	3.3	1.5
	M193	2,512	131	5.2	70	2.8	40.2	2.0	0.9
	M196	2,858	220	7.7	4	2.7	44.8	3.1	1.5
A-R	M193	2,680	159	5.9	74	2.9	44.8	2.3	1.1
	M196	2,439	158	6.5	75	3.2	45.4	2.6	1.1

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit  
\*\* - M80-18.3 rd/lb; M62-18.9 rd/lb;  
M198-17.4 rd/lb; M193-39.3 rd/lb;  
M196-40.2 rd/lb.  
H/PS - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad  
\* - Based on four groups of M14's.

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TABLE 7-2  
DAY DEFENSE -- RIFLES  
AUTOMATIC FIRE, SUMMARY OF ALL RANGES

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M20	13,406*	598	4.5	306	2.4	46.3	0.8	1.0
	M62	13,413*	564	4.2	299	2.4	44.7	0.8	1.0
	M198	13,131*	843	6.4	310	2.5	46.3	0.6	0.8
S-R	M193	4,251	184	4.3	88	2.7	52.9	1.7	1.3
	M196	3,871	220	5.7	86	2.3	51.7	2.3	1.5
XM16E1	M193	3,307	205	6.2	81	2.6	48.8	2.4	1.4
	M196	3,490	220	6.3	87	2.6	52.3	2.5	1.5
H-R	M193	2,987	110	2.7	57	2.0	35.1	1.4	0.8
	M196	3,663	170	4.6	78	2.2	47.1	1.9	1.2
A-R	M193	3,162	152	4.8	75	2.4	44.3	1.9	1.1
	M196	2,468	113	4.6	64	2.8	39.1	1.8	0.8

LEGEND: HC - Hit Capability  
HP - Hit Probability  
\* - Based on four groups of M14's.

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad  
PTH - Percent Targets Hit

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2.7.3.1.2 (C) The relative effectiveness of the candidate rifles in the night defense is indicated in Table 7-3.

TABLE 7-3

NIGHT DEFENSE, SEMIAUTOMATIC FIRE -- RIFLES

WEAPON	AMMO	RANGE (Meters)						Both Ranges		
		20			40					
		HC	HP	PTH	HC	HP	PTL	HC	HP	PTH
M14	M80	22.6	4.1	71.9	5.5	2.3	45.0	13.6	3.2	59.3
	M62	48.5	5.6	91.1	16.5	2.9	56.9	31.9	4.0	75.0
	M198	34.8	3.9	69.4	9.9	2.2	44.2	22.3	3.1	57.5
J-R	M193	18.1	3.0	79.9	3.0	1.4	37.0	10.9	2.2	59.5
	M196	45.9	3.1	83.3	17.2	1.5	44.4	25.3	2.3	64.8
XM16E1	M193	32.8	4.8	83.3	5.6	2.1	40.7	19.1	3.4	63.0
	M196	33.5	5.0	89.9	19.6	2.2	44.4	34.9	3.6	68.3
H-R	M193	15.9	3.5	59.9	5.6	1.6	29.6	10.8	2.5	45.5
	M196	58.8	4.7	79.9	22.9	3.6	66.6	40.9	4.2	73.5
A-R	M193	32.2	5.2	83.3	8.1	2.4	47.6	19.5	3.7	66.7
	M196	75.4	5.6	87.5	25.6	2.9	57.1	48.9	4.2	73.3

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

2.7.3.1.3 (C) The relative effectiveness of the candidate rifles against a moving target is indicated in Table 7-4.

2.7.3.1.4 (C) A summary of results with respect to suppressive fire is indicated in Charts 7-15 and 7-16, Appendix II.



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TABLE 7-4

MOVING TARGET -- RIFLES

(350 Meters)

WEAPON	AMMO	TARGET HITS*	
		SEMI-AUTOMATIC	AUTOMATIC
M14**	M80	21.0	9.8
	M62	10.0	6.8
	M198	23.3	10.5
S-R	M193	21	15
	M196	15	17
XM16E1	M193	24	14
	M196	16	13
H-R	M193	0	7
	M196	18	7
A-R	M193	12	4
	M196	16	7

LEGEND: \* Total of Group of Firers

\*\* An average of the four groups is listed for the M14.

2.7.3.1.5 (C) When questioned, test soldiers stated that the degree of feedback was significantly greater with 7.62-mm ammunition than with 5.56-mm ammunition out to 800 meters. Beyond 800 meters the degree of feedback with 7.62-mm and 5.56-mm ammunition diminished rapidly to a point of insignificance.

2.7.3.1.6 (C) When questioned concerning night tracer muzzle obscuration effects, the test soldiers stated that there was no difficulty experienced with muzzle obscuration with any of the candidate rifles.

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## 2.7.3.2 (C) Carbines (U)

2.7.3.2.1 (C) The relative effectiveness of the candidate carbines against targets in tactical disposition in the day defense in terms of hits per rounds fired, pounds of ammunition per weapon, unit of time, modes of fire, existing rates of fire, trigger pulls (semiautomatic), and types of ammunition is indicated in Tables 7-5 and 7-6. Detailed results by range are indicated in Charts 7-17 through 7-30, Appendix II.

2.7.3.2.2 (C) The relative effectiveness of the candidate carbines in the night defense is indicated in Table 7-7. However, it must be noted that firing occurred under three quarters to full moon conditions on a clear night.

2.7.3.2.3 (C) The relative effectiveness of the candidate carbines against a moving target is indicated in Table 7-8.

2.7.3.2.4 (C) A summary of results with respect to suppressive fire is indicated in Charts 7-31 and 7-32, Appendix II.

2.7.3.2.5 (C) When questioned as to the degree of feedback, the test soldiers' statements were as indicated in paragraph 2.7.3.1.5.

2.7.3.2.6 (C) When questioned concerning night tracer muzzle obscuration effects, the test soldiers stated that no difficulty was experienced with any of the candidate carbines except the C-SMG, which produced more muzzle flash and resulting muzzle obscuration. However, the tracer feedback was sufficient for the firer to identify the targets in the target area and to overcome the effects of muzzle flash by adjusting fire through feedback from the target area (see Sub-Test 11, Signature Characteristics; and Sub-Test 8, Assault).

## 2.7.3.3 (C) Automatic Rifles (U)

2.7.3.3.1 (C) The relative effectiveness of the candidate automatic rifles against targets in tactical disposition in the day defense in terms of hits/rounds fired, pounds of ammunition/weapon, unit of time, modes of fire, existing rates of fire, trigger pulls (automatic fire), and types of ammunition is indicated in Tables 7-9 and 7-10. Detailed results by range are indicated in Charts 7-33 through 7-52, Appendix II.

2.7.3.3.2 (C) The relative effectiveness of the candidate automatic rifles in the night defense is indicated in Table 7-11.

2.7.3.3.3 (C) The results of firing the candidate automatic rifles against a moving target are indicated in Table 7-12.

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TABLE 7-5

DAY DEFENSE -- CARBINES  
SEMIAUTOMATIC FIRE, SUMMARY OF ALL RANGES

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	2,327	113	4.9	66	2.8	37.9	0.9	0.8
	M62	1,899	98	5.2	56	2.9	32.2	1.0	0.7
	M198	2,012	156	7.8	46	2.3	26.4	1.3	1.1
S-C	M193	2,059	132	6.4	59	2.9	33.9	2.5	0.9
	M196	2,936	138	4.7	61	2.1	35.1	1.9	1.0
C-SMG	M193	2,867	99	3.5	52	1.8	29.9	1.4	0.7
	M196	2,990	136	4.5	69	2.3	39.7	1.9	0.9

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit  
H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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TABLE 7-6  
DAY DEFENSE -- CARBINES  
AUTOMATIC FIRE, SUMMARY OF ALL RANGES

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	4,059	112	2.8	65	1.6	37.4	0.5	0.8
	M62	3,599	134	3.7	66	1.8	37.9	0.7	0.9
	M198	3,483	184	5.3	81	2.3	46.6	0.9	1.3
S-C	M193	5,066	136	2.7	61	1.2	35.1	1.1	0.9
	M196	4,597	155	3.4	71	1.5	40.8	1.4	1.1
C-SMG	M193	5,261	120	2.3	57	1.1	32.8	0.9	0.8
	M196	5,559	190	3.4	77	1.4	44.3	1.4	1.3

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit  
H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/  
Squad

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TABLE 7-7  
NIGHT DEFENSE, SEMIAUTOMATIC FIRE -- CARBINES

WEAPON	AMMO	RANGE (Meters)						BOTH RANGES		
		20			40					
		HC	HP	PTH	HC	HP	PTH	HC	HP	PTH
M14	M80	46.0	2.8	76.7	18.0	2.1	63.0	32.0	2.5	70.2
	M62	51.7	3.2	86.7	23.2	2.3	70.4	37.5	2.8	78.9
	M198	71.5	2.7	73.3	45.7	2.3	70.4	58.6	2.5	71.9
S-C	M193	30.2	2.6	70.0	15.8	2.0	59.2	23.0	2.3	64.9
	M196	60.7	2.7	73.3	26.9	2.1	63.0	43.8	2.4	68.4
C-SMG	M193	21.4	2.0	53.3	5.2	1.5	44.4	13.3	1.7	49.1
	M196	60.6	3.4	93.3	23.8	2.1	63.0	47.2	2.8	78.9

LEGEND: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit.

TABLE 7-8  
MOVING TARGET, CARBINES  
(350 Meters)

WEAPON	AMMUNITION	TARGET HITS*	
		SEMIAUTOMATIC	AUTOMATIC
M14	M80	5	11
	M62	9	20
	M198	8	10
S-C	M193	3	15
	M196	4	6
C-SMG	M193	4	5
	M196	4	16

\* Total of Group of firers.

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TABLE 7-10

DAY DEFENSE - AUTOMATIC RIFLES - SEMIAUTOMATIC FIRE - SUMMARY OF ALL RANGES  
(Average of Five Pairs)

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S (Per Indv)
M14E2	M80	132.8	17.0	12.8	11.6	8.7	16.6	2.4	0.2
	M62	107.6	10.4	9.7	8.2	7.6	11.7	1.8	0.1
	M198	125.2	15.2	12.9	12.8	10.4	18.6	2.1	0.1
C-AR	M193	151.2	21.2	14.0	13.8	9.1	19.7	5.4	0.2
	M196	132.6	18.6	14.0	13.0	9.8	18.6	5.6	0.2

LEGEND: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit.  
H/PD - Hits/Pound of Ammunition.  
H/S - Hits/Second of Firing Time/Individual.

TABLE 7-11

NIGHT DEFENSE - AUTOMATIC RIFLES  
AUTOMATIC FIRE  
(Average of Five Pairs)

WEAPON	AMMO	RANGE (Meters)						BOTH RANGES		
		20			40					
		HC	HP	PTH	HC	HP	PTH	HC	HP	PTH
M14E2	M80	23.8	7.6	76.0	7.0	3.2	53.3	15.4	5.4	64.7
	M62	24.6	7.2	72.0	7.6	3.8	63.3	16.1	5.5	67.7
	M198	41.4	7.4	74.0	10.6	3.0	50.0	26.0	5.2	62.0
C-AR	M193	17.2	5.8	58.0	5.2	1.8	30.0	11.2	3.8	44.0
	M196	31.0	7.6	76.0	7.4	2.2	36.7	19.2	4.9	56.4
S-AR	M193	13.8	4.6	46.0	2.6	1.2	20.0	8.2	2.9	33.0
	M196	57.2	8.8	88.0	3.2	1.8	30.0	30.2	5.3	59.0

LEGEND: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit.

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TABLE 7-12  
AUTOMATIC RIFLES - MOVING TARGET - 350 METERS

WEAPON	AMMO	TARGET HITS *	
		SEMIAUTOMATIC	AUTOMATIC
M14E2	M80	23	6
	M62	13	1
	M198	5	11
C-AR	M193	28	9
	M196	13	16
S-AR	M193	--	7
	M196	--	32

2.7.3.3.4 (C) A summary of results of suppressive fire of the candidate automatic rifles is indicated in Charts 7-53 and 7-54, Appendix II.

2.7.3.3.5 (C) The relative effectiveness of the candidate automatic rifles employed by all the members of a rifle squad for both automatic and semiautomatic fire to provide a basis of comparison with the candidate rifles and carbines is indicated in Tables 7-13 and 7-14. Detailed results by range are indicated in Charts 7-55 through 7-70, Appendix II.

2.7.3.3.6 (C) When questioned as to the degree of feedback, the test soldiers' statements were as indicated in paragraph 2.7.3.1.5.

## 2.7.3.4 (C) Machine Guns (U)

2.7.3.4.1 (C) The relative effectiveness of the candidate machine guns against targets in tactical disposition in the day defense in terms of hits/rounds fired, pounds of ammunition/weapon, unit of time, modes of fire, existing rates of fire, trigger pulls (automatic fire), and types of ammunition is depicted in Table 7-9. Detailed results by range are reflected in Charts 7-71 through 7-80, Appendix II.

2.7.3.4.2 (C) The relative effectiveness of the candidate machine guns with respect to predetermined fire at night is indicated in Table 7-15. Detailed results by range are indicated in Chart 7-81, Appendix II.

2.7.3.4.3 (C) The relative effectiveness of the candidate machine guns with respect to illuminated fire at night is indicated in Table 7-16. Detailed results by range are indicated in Chart 7-82, Appendix II.

2.7.3.4.4 (C) The relative effectiveness of the candidate machine guns against a moving target is indicated in Table 7-17.

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TABLE 7-13

DAY DEFENSE - AUTOMATIC RIFLES - AUTOMATIC FIRE - SUMMARY OF ALL RANGES  
(Squad Exercise)

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S (Per Squad)
M14E2	M80	1157	80	6.9	29	2.5	50.0	1.3	1.5
	M62	1255	79	6.3	37	2.9	63.8	1.2	1.5
	M198	1200	141	11.8	39	3.2	67.2	2.1	2.6
C-AR	M193	1810	152	8.4	37	2.0	63.8	3.3	2.8
	M196	1768	137	7.7	33	1.9	56.9	3.1	2.5
S-AR	M193	1781	130	7.3	37	2.1	63.8	2.8	2.3
	M196	1240	183	14.8	42	3.4	72.4	5.9	3.4

LEGEND: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit.  
H/PD - Hits/Pound Ammunition.  
H/S - Hits/Second of Firing Time/Squad.

TABLE 7-14

DAY DEFENSE - AUTOMATIC RIFLES - SEMIAUTOMATIC FIRE - SUMMARY OF ALL RANGES  
(Squad Exercise)

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S (Per Squad)
M14E2	M80	849	81	9.5	33	3.9	56.9	1.8	1.5
	M62	777	102	13.1	38	4.9	65.5	2.5	1.9
	M198	714	103	14.4	37	5.2	63.8	2.5	1.9
C-AR	M193	982	86	8.8	37	3.8	63.8	3.4	1.6
	M196	1040	165	15.9	36	3.5	62.1	6.3	3.1

LEGEND: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit.  
H/PD - Hits/Pound of Ammunition.  
H/S - Hits/Second of Firing Time/Squad.

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TABLE 7-15

NIGHT DEFENSE - PREDETERMINED FIRE - MACHINE GUNS  
SUMMARY OF ALL RANGES  
(Average of Five Firers)

WEAPON	AMMUNITION	AVG TIME TO FIRE (Sec)	AVG TIME TO SHIFT	TRIGGER PULLS	TGT HITS	TGTS HIT	HP	HC	H/PD	H/S (Per Indv)	PTH	H/ TP
M60-MMG	4M80:1M62 (400 Rd)	431.2	205.6	68.8	27.6	13.2	3.3	6.9	1.1	.06	20.6	0.4
	M62 (400 Rd)	206.0	141.4	68.0	24.0	11.0	2.8	6.0	1.0	.12	17.2	0.4
	4M198:1M62 (400 Rd)	156.4	117.8	69.4	32.2	13.2	3.3	8.0	1.2	.21	20.6	0.5
S-MMG	4M193:1M196 (400 Rd)	390.2	178.2	67.6	20.4	11.2	2.8	5.1	1.7	.05	17.5	0.3
	M196 (400 Rd)	245.6	143.6	67.0	18.2	10.2	2.6	4.6	1.5	.07	15.9	0.3

LEGEND: HC - Hit Capability. H/PD - Hits/Pound of Ammunition.  
HP - Hit Probability. H/S - Hits/Second of Firing Time/  
PTA - Percent of Targets Hit. Individual.  
NOTE: 50 Rds per target array per firer. H/TP - Hits/Trigger Pull.

TABLE 7-16

NIGHT DEFENSE - ILLUMINATED FIRING - MACHING GUNS  
SUMMARY OF ALL RANGES  
(Average of Five Firers)

WEAPON	AMMUNITION	AVG TIME TO FIRE (Sec)	TRIGGER PULLS	TGT HITS	TGTS HIT	HP	HC	H/PD	H/S (Per Indv)	PTH	H/TP
M60-LMG	4M80:1M62 (400 Rd)	116.4	71.6	20.8	11.8	3.0	5.2	.8	.18	18.4	0.3
M60-MMG	4M80:1M62 (400 Rd)	143.2	68.8	17.4	10.2	2.6	4.4	.7	.12	15.9	0.3
S-LMG	4M193:1M196 (400 Rd)	233.4	78.2	16.8	9.8	2.5	4.2	1.4	.07	15.3	0.2
S-MMG	4M193:1M196 (400 Rd)	221.4	71.4	11.0	7.2	1.8	2.8	.9	.05	11.3	0.2

LEGEND: HC - Hit Capability. H/PD - Hits/Pound of Ammunition.  
HP - Hit Probability. H/S - Hits/Second of Firing  
PTH - Percent of Targets Hit. Time/Individual.  
NOTE: 50 Rds per target array per firer. H/TP - Hits/Trigger Pull.

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TARGET 7-17

MOVING TARGET - MACHINE GUNS  
350 METERS

WEAPON	AMMUNITION	TARGET HITS*
M60-LMG	4M80:1M62	24
	4M198:1M62	41
M60-MMG	4M80:1M62	14
	4M198:1M62	13
S-LMG	4M193:1M196	20
S-MMG	4M193:1M196	9

\* Total of five pairs of firers.

2.7.3.4.5 (C) A summary of results of suppressive fire of the candidate machine guns is indicated in Chart 7-83, Appendix II.

2.7.3.4.6 (C) When questioned as to the degree of feedback, the test soldiers' statements were as indicated in paragraph 2.7.3.1.5.

2.7.4 (C) ANALYSIS (U)

2.7.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.7.4.1.1 (C) The effectiveness of the candidate rifles, carbines, and automatic rifles against stationary targets in tactical disposition for day defense, with all types of ammunition used, is reflected in Tables 7-1, 7-2, 7-5, 7-6, 7-9, 7-10, 7-13, and 7-14.

2.7.4.1.2 (C) The effectiveness of candidate rifles, carbines, and automatic rifles against stationary targets in tactical disposition for the night defense, with all types of ammunition used, is reflected in Tables 7-3, 7-7, and 7-11.

2.7.4.1.3 (C) The effectiveness of candidate rifles, carbines, and automatic rifles firing area or suppressive fire at the longer ranges is reflected in Charts 7-15, 7-16, 7-31, 7-32, 7-54, and 7-83, Appendix II.

2.7.4.1.4 (C) There were so few hits against a moving ground target that the effectiveness of candidate rifles, carbines, and automatic rifles could not be determined.

2.7.4.1.5 (C) The XM16E1 firing tracer ammunition and the M14 firing duplex ammunition were significantly more effective in the day defense,

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and the A-R firing tracer ammunition was significantly more effective in the night defense.

2.7.4.1.6 (C) The M14 firing duplex ammunition and the S-C firing ball ammunition were the most effective candidate carbines in the day and night defense. However, there is no significant difference between the S-C and the M14, and little significant difference between these and the C-SMG.

2.7.4.1.7 (C) There is no significant difference between candidate automatic rifles.

## 2.7.4.2 (C) Machine Guns (U)

2.7.4.2.1 (C) The effectiveness of candidate machine guns against stationary targets in tactical disposition for day defense, with all types of ammunition used, is reflected in Table 7-9.

2.7.4.2.2 (C) The effectiveness of candidate machine guns against stationary targets in tactical disposition for night defense, with all types of ammunition used, is reflected in Tables 7-15 and 7-16.

2.7.4.2.3 (C) The effectiveness of candidate machine guns in area or suppressive fire, at the longer ranges, is reflected in Chart 7-83, Appendix II.

2.7.4.2.4 (C) There were so few hits against a moving ground target, that the effectiveness of candidate machine guns could not be determined.

2.7.4.2.5 (C) The M60 firing 4 duplex to 1 tracer is significantly the most effective candidate machine gun in both the day and night defense.

2.7.4.3 (C) The results of firing suppressive fire, and of firing at moving targets, did not yield any distinguishable significant differences within candidate weapon types.

2.7.4.4 (C) All the rifle, carbine, automatic rifle, and machine gun candidates are suitable with respect to feedback. The trace of both M62 and M196 is suitable. The 7.62-mm ammunition provides more impact feedback than the 5.56-mm ammunition, without respect to weapon type.

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## 2.8 (C) SUB-TEST NO 8, ASSAULT, DAY AND NIGHT (U)

### 2.8.1 (C) OBJECTIVES (U)

#### 2.8.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

To determine relative accuracy and effectiveness of each weapon against the following target situation: day and night assault (Ref para 4b(6), Part I, App III).

#### 2.8.1.2 (C) Machine Guns (U)

##### Specific

To determine relative effectiveness and accuracy of each weapon in the following target situation: day and night assault (Ref para 2b(6), Part II, App III).

### 2.8.2 (C) METHOD (U)

#### 2.8.2.1 (C) Rifles and Carbines (U)

2.8.2.1.1 (C) Within each 30-man test group, test soldiers were armed either with rifles or carbines, and were organized into 10-man squads (squads were matched insofar as possible). Each squad negotiated a selected course approximately 1 mile long over varied terrain to simulate an approach march prior to an attack. Throughout the course, test soldiers were required to run, jump, hit the ground rapidly, and assume various firing positions. The squads then negotiated a 100-meter day assault exercise which culminated in a defense against a counterattack while wearing protective masks. Targets within the objective area represented personnel in the open, and personnel in emplacements constructed of logs, sandbags, and earth. Targets hit and target hits were recorded. Hit probability was determined for each type target. Ball, tracer, and duplex ammunition was used, and hit probability with each was determined. Test soldiers were questioned as to the ease and comfort of carrying and firing their weapons; whether there were any projections on their weapons which could become entangled in brush, grass, or obstacles; and whether their weapons were compatible with load-carrying equipment.

2.8.2.1.2 (C) The night assault was conducted with test personnel organized as described in paragraph 2.8.2.1.1. The assault covered approximately 75 meters, and only personnel-type targets were utilized. Blinking red lights were attached to personnel targets to simulate enemy fire. Targets hit and target hits were recorded. Hit probability was determined. The exercise was conducted using ball, tracer, and duplex ammunition. The hit probability with each was determined.

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## 2.8.2.2 (C) Automatic Rifles (U)

The ten automatic riflemen were divided into five pairs. The same exercises described in paragraphs 2.8.2.1.1 and 2.8.2.1.2 were conducted, using eight riflemen firing blank ammunition, with the two automatic riflemen firing live ammunition, except that prior to the day assault, each automatic rifleman fired 100 rounds from each of two support fire positions at 275 and 100 meters.

## 2.8.2.3 (C) Machine Guns (U)

2.8.2.3.1 (C) The ten machine gunners were divided into five pairs. Each pair negotiated the cross-country course described in paragraph 2.8.2.1.1 with each type of candidate medium machine gun. Any difficulties in carrying the weapons were noted. Prior to the assault, each test soldier fired 100 rounds from each of two support fire positions at 275 and 100 meters. The time required, and any difficulties encountered in going into and out of action with each medium machine gun in each support fire position, were noted.

2.8.2.3.2 (C) The medium machine guns were then converted to light machine guns, and the times to accomplish this were recorded. Each pair of test soldiers then negotiated the assault course described in paragraph 2.8.2.1.1, during daylight, with each type light machine gun as a part of a rifle squad. Other squad members fired blank ammunition. Test soldiers used a 4-1 mix of ball and tracer, and a 4-1 mix of duplex and tracer ammunition.

2.8.2.3.3 (C) The assault described in 2.8.2.1.2 was conducted during the hours of darkness with the candidate machine guns being fired in pairs as light machine guns. Tracer ammunition, 4-1 mix of ball and tracer, and 4-1 mix of duplex and tracer were used.

2.8.2.3.4 (C) Particular attention was given to determining the following:

a. Effectiveness of the candidate machine guns when fired using a sling-supported position.

b. Visibility of tracer ammunition under all light conditions encountered during testing.

c. Night tracer muzzle obscuration effects on the firer and adjacent firers.

d. The hit probability with each type or mix of ammunition used for both day and night firing.

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## 2.8.3 (C) RESULTS (U)

### 2.8.3.1 (C) Rifles (U)

2.8.3.1.1 (C) The relative effectiveness of the candidate rifles in the day and night assault is indicated in Table 8-1.

2.8.3.1.2 (C) The relative effectiveness of the candidate rifles in the counterattack phase is indicated in Table 8-2.

TABLE 8-1

#### DAY AND NIGHT ASSAULT, RIFLE TEST GROUPS

WEAPON	AMMO	DAY ASSAULT			NIGHT ASSAULT		
		HC	HP	PTH	HC	HP	PTH
M14	M80	15.9	2.7	84.0	8.2	1.3	92.5
M14	M62	13.8	2.3	75.7	12.4	1.3	95.0
M14	M198	25.9	2.6	84.3	12.0	1.2	92.5
S-R	M193	9.8	1.5	78.5	6.5	0.9	89.9
S-R	M196	14.2	1.7	77.1	17.3	1.9	100.0
XM16E1	M193	9.9	2.4	73.2	12.0	1.4	89.9
XM16E1	M196	11.9	2.1	79.8	16.4	1.1	100.0
H-R	M193	17.1	4.3	78.5	11.5	1.5	100.0
H-R	M196	16.0	2.3	83.8	18.6	1.3	96.6
A-R	M193	15.3	1.9	71.8	11.1	1.3	89.9
A-R	M196	12.0	2.2	73.2	22.1	1.5	93.2

Legend: HC - Hit Capability.  
 HP - Hit Probability  
 PTH - Percent of Targets Hit.

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TABLE 8-2

DAY AND NIGHT ASSAULT - COUNTERATTACK PHASE

RIFLE TEST GROUPS

WEAPON	AMMO	DAY COUNTERATTACK			NIGHT COUNTERATTACK		
		HC	HP	PTH	HC	HP	PTH
M14	M80	15.2	4.2	62.5	12.5	3.4	60.0
M14	M62	14.2	3.9	62.5	15.9	3.6	63.3
M14	M198	25.2	4.1	62.5	18.0	3.6	63.3
S-R	M193	11.2	3.0	66.7	14.6	1.9	50.0
S-R	M196	14.2	3.3	63.3	17.9	2.8	76.6
XM16E1	M193	22.7	4.4	53.3	8.5	4.6	92.6
XM16E1	M196	18.8	4.6	66.7	41.1	3.9	77.8
H-R	M193	12.3	4.2	60.0	8.7	3.1	56.6
H-R	M196	21.6	5.1	69.9	25.7	4.4	80.0
A-R	M193	9.4	2.8	43.3	6.7	2.5	43.3
A-R	M196	22.5	3.0	46.6	14.0	4.0	69.9

Legend: HC - Hit Capability.  
 HP - Hit Probability.  
 PTH - Percent of Targets Hit.

## 2.8.3.2 (C) Carbines (U)

2.8.3.2.1 (C) The relative effectiveness of the carbine candidates in the day and night assault is indicated in Table 8-3.

2.8.3.2.2 (C) The relative effectiveness of the carbine candidates in the counterattack phase is indicated in Table 8-4.

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TABLE 8-3

## DAY AND NIGHT ASSAULT, CARBINE TEST GROUPS

WEAPON	AMMO	DAY			NIGHT		
		HC	HP	PTH	HC	HP	PTH
M14	M80	14.3	2.3	88.0	17.0	1.1	45.0
M14	M62	17.4	2.4	84.0	8.3	1.0	48.3
M14	M198	20.1	2.2	85.3	10.2	0.9	45.0
S-C	M193	10.4	1.4	88.0	4.9	0.6	41.7
S-C	M196	11.6	1.6	86.7	10.8	0.8	48.3
C-SMG	M193	8.4	1.4	84.0	5.4	0.7	45.0
C-SMG	M196	7.5	1.4	86.7	7.7	0.6	50.5

Legend: HC - Hit Capability.  
 HP - Hit Probability.  
 PTH - Percent of Targets Hit.

TABLE 8-4

## DAY AND NIGHT ASSAULT, COUNTERATTACK PHASE

### CARBINE TEST GROUPS

WEAPON	AMMO	DAY			NIGHT		
		HC	HP	PTH	HC	HP	PTH
M14	M80	17.5	3.8	73.3	16.0	3.0	60.0
M14	M62	15.3	2.9	53.3	17.8	3.5	70.0
M14	M198	16.2	4.1	73.3	15.2	2.4	53.3
S-C	M193	11.2	2.5	63.3	7.1	1.1	33.3
S-C	M196	13.4	2.6	70.0	17.7	2.2	66.7
C-SMG	M193	8.4	2.5	60.0	4.4	1.0	30.0
C-SMG	M196	16.2	2.5	66.7	20.0	2.4	73.3

Legend: HC - Hit Capability.  
 HP - Hit Probability.  
 PTH - Percent of Targets Hit

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## 2.8.3.3 (C) Automatic Rifles (U)

2.8.3.3.1 (C) The relative effectiveness of the candidate automatic rifles in the supporting role is indicated in Table 8-5.

2.8.3.3.2 (C) The relative effectiveness of the candidate automatic rifles in the day and night assault is indicated in Table 8-6.

2.8.3.3.3 (C) The relative effectiveness of the candidate automatic rifles in the counterattack phase is indicated in Table 8-7.

## 2.8.3.4 (C) Machine Guns (U)

2.8.3.4.1 (C) The relative effectiveness of the candidate machine guns in the supporting role is indicated in Table 8-5.

2.8.3.4.2 (C) The relative effectiveness of the candidate machine guns in the day and night assault is indicated in Table 8-6.

2.8.3.4.3 (C) The relative effectiveness of the candidate machine guns in the counterattack phase is indicated in Table 8-7.

## 2.8.4 (C) ANALYSIS (U)

### 2.8.4.1 (C) Rifles (U)

2.8.4.1.1 (C) The relative effectiveness of each candidate rifle in the day and night assault is listed in Table 8-1.

2.8.4.1.2 (C) In the day assault the H-R and M14 (duplex) are overall significantly more effective than the other candidate rifles. There is no significant overall difference between the other candidate rifles.

2.8.4.1.3 (C) In the night assault, the A-R firing tracer is significantly more effective with respect to hit capability than the other candidate rifles.

### 2.8.4.2 (C) Carbines (U)

2.8.4.2.1 (C) The relative effectiveness of each candidate carbine in the day and night assault is listed in Table 8-3.

2.8.4.2.2 (C) In the day assault the M14 (duplex) has a significantly higher hit capability than the S-C and C-SMG.

2.8.4.2.3 (C) In the night assault the M14 (ball) has a significantly higher hit capability than the S-C and C-SMG.

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TABLE 8-5  
DAY ASSAULT, SUPPORTING FIRE -- AUTOMATIC RIFLES AND MEDIUM MACHINE GUNS  
(Average of Five Pairs)

WEAPON	AMMUNITION	HC		HP		PTH		INTO ACTION TIME (Secs)	OUT OF ACTION TIME (Secs)	CONVERSION TIME (Secs)	RE-LOADING TIME (Secs)
		* 1st Pos	** 2d Pos	1st Pos	2d Pos	1st Pos	2d Pos				
M14E2	M80	8.7	27.4	1.5	1.5	100	100	---	---	---	---
M14E2	M62	11.7	20.0	1.5	1.5	100	100	---	---	---	---
M14E2	M198	20.2	47.3	1.5	1.5	100	100	---	---	---	---
C-AR	M193	18.1	42.9	1.5	1.5	100	100	---	---	---	---
C-AR	M196	22.3	53.8	1.5	1.5	100	100	---	---	---	---
S-AR	M193	26.0	51.5	1.5	1.5	100	100	---	---	---	---
S-AR	M196	20.3	43.3	1.5	1.5	100	100	---	---	---	---
M60-MMG	4M80:1M62	18.0	36.2	1.3	1.5	86.7	100	46.3	9.9	14.1	15.6
M60-MMG	4M198:1M62	30.5	65.3	1.5	1.5	100	100	41.7	15.8	15.3	14.1
S-MMG	4M193:1M196	14.0	40.8	1.5	1.5	100	100	45.5	13.2	19.0	22.6

Legend: HC - Hit Capability.  
HP - Hit Probability.  
PTH - Percent of Targets Hit  
\* Three "E"-type silhouettes at a range of 275 meters.  
\*\* Three "E"-type silhouettes at a range of 100 meters.

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TABLE 8-6

DAY AND NIGHT ASSAULT - AUTOMATIC RIFLES AND LIGHT MACHINE GUNS

(Average of Five Pairs)

WEAPON	AMMUNITION	DAY ASSAULT			NIGHT ASSAULT		
		HC	HP	PTH	HC	HP	PTH
M14E2	M80	4.6	2.8	28.0	9.9	3.1	62.0
M14E2	M62	6.2	3.2	29.6	8.9	3.1	58.0
M14E2	M198	7.2	3.1	36.0	5.8	2.8	56.0
C-AR	M193	5.1	2.6	38.4	9.1	2.9	58.0
C-AR	M196	9.2	2.8	40.0	11.5	3.7	74.0
S-AR	M193	6.4	2.4	30.4	7.9	2.4	48.0
S-AR	M196	6.6	2.7	40.8	15.9	3.3	66.0
M60-LMG	4M80:1M62	6.3	2.7	43.2	10.9	2.9	58.0
M60-LMG	4M198:1M62	9.2	3.5	55.2	14.0	3.3	66.0
M60-LMG	M62 *	-	-	-	12.6	3.5	70.0
S-LMG	4M193:1M196	7.4	2.5	36.8	9.6	3.4	68.0
S-LMG	M196 *	-	-	-	8.1	3.3	66.0

Legend: HC - Hit Capability.

HP - Hit Probability

PTH - Percent of Targets Hit.

\* - Machine guns did not fire tracer in day assault.

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TABLE 8-7

## DAY AND NIGHT ASSAULT - COUNTERATTACK PHASE

### AUTOMATIC RIFLES AND LIGHT MACHINE GUNS

(Average of Five Pairs)

WEAPON	AMMUNITION	DAY COUNTERATTACK			NIGHT COUNTERATTACK		
		HC	HP	PTH	HC	HP	PTH
M14E2	M80	17.7	5.1	28.0	9.5	3.1	62.0
M14E2	M62	8.4	3.0	26.0	5.0	2.1	42.0
M14E2	M198	21.8	7.5	50.0	7.7	2.8	56.0
C-AR	M193	16.8	3.6	30.0	8.2	2.7	54.0
C-AR	M196	12.3	3.8	42.0	13.0	3.2	64.0
S-AR	M193	11.4	2.7	26.0	9.3	2.4	48.0
S-AR	M196	16.1	4.5	44.0	15.3	3.3	66.0
M60-LMG	4M80:1M62	6.6	1.6	28.0	9.8	2.9	58.0
M60-LMG	4M198:1M62	8.2	2.5	38.0	8.1	2.5	50.0
M60-LMG	M62 *	--	-	-	11.8	2.6	52.0
S-LMG	4M193:1M196	5.7	2.6	34.0	5.5	2.0	40.0
S-LMG	M196 *	-	-	-	9.7	2.8	56.0

Legend: HC - Hit Capability.  
 HP - Hit Probability.  
 PTH - Percent of Targets Hit  
 \* - Machine Guns did not fire tracer in daylight.

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## 2.8.4.3 (C) Automatic Rifles (U)

2.8.4.3.1 (C) The relative effectiveness of each candidate automatic rifle in the day and night assault is listed in Table 8-6.

2.8.4.3.2 (C) In the day assault supporting fire, the M14E2 firing ball and tracer is significantly less effective than the other candidate automatic rifles.

2.8.4.3.3 (C) In the day assault there is no overall significant difference between the candidate automatic rifles.

2.8.4.3.4 (C) In the night assault the S-AR firing tracer is significantly more effective than the other candidate automatic rifles.

2.8.4.3.5 (C) In the night counterattack the S-AR and C-AR firing tracer are significantly more effective than the M14E2 firing tracer.

## 2.8.4.4 (C) Machine Guns (U)

2.8.4.4.1 (C) The relative effectiveness of each candidate light machine gun in the day and night assault is listed in Table 8-6.

2.8.4.4.2 (C) In the day assault and night assault there is no significant difference between the candidate light machine guns.

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## 2.9 (C) SUB-TEST NO 9, MOUNTS FOR MACHINE GUNS (U)

### 2.9.1 (C) OBJECTIVE (U)

#### Specific

#### 2.9.1.1 (C) To determine:

a. The capability of the machine gun candidates to be used as a hand-carried weapon fired from supported positions, ground mounted on sustained fire mounts, and as fixed or semi-fixed machine guns mounted on selected combat wheeled and tracked vehicles (ref para 2, Part II, App III).

b. The suitability of mounting the weapons on selected wheel and tracked vehicles (ref para 7g, Part II, App III).

#### 2.9.1.2 (C) To evaluate:

a. Sustained fire mount for provision of maximum free horizontal and vertical movement and controlled horizontal and vertical movement (ref para 1a(10), Part II, App III).

b. The traversing and elevating mechanism for minimum free play (ref para 1a (10), Part II, App III).

### 2.9.2 (C) METHOD (U)

2.9.2.1 (C) Throughout all tests, the capability of the candidate machine guns to be used as a hand-carried weapon fired from supported positions and ground mounted on a sustained fire mount (tripod) was noted.

2.9.2.2 (C) Since no mount was provided for the Code S machine guns, no attempt was made to mount and fire the candidate machine guns on the pedestal mount of a Truck,  $\frac{1}{2}$ -ton, 4x4, M151.

2.9.2.3 (C) Three of each type candidate machine gun mounted in the respective sustained fire mounts were rotated horizontally and vertically through the maximum arc permitted by the mount, using both free and controlled movement. The arcs were measured and recorded in mils.

2.9.2.4 (C) During the conduct of Sub-Test No 7, Defense, Day and Night, times required to make large deflection changes were noted. In addition, the predetermined fire data were evaluated in an attempt to compare the free play of the elevating and traversing mechanisms of the candidate machine guns.

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## 2.9.3 (C) RESULTS (U)

2.9.3.1 (C) Throughout all testing it was observed that both the M60 and Code S machine guns were capable of being used as hand-carried weapons fired from supported positions, and as ground mounted guns on sustained fire mounts.

2.9.3.2 (C) The results of measuring the horizontal and vertical arcs of the M60-MMG and S-MMG are depicted in Table 9-1. The maximum arcs obtainable were not usable in all cases. The traversing bars on the M122 and M2 tripod mounts were graduated for only 975 mils. The maximum controlled elevation and depression arcs were about the limit that a test soldier could obtain while maintaining a satisfactory prone firing position.

2.9.3.3 (C) The elevating handwheels for both the M122 and M2 tripod mounts bind on occasion precluding use of the full range of the elevating mechanism (ref Fig 87). The bind could usually be eliminated by cleaning and manipulating.

TABLE 9-1

HORIZONTAL AND VERTICAL ARCS - MACHINE GUN MOUNTS  
(Average of Three)

	Maximum (Mils)		USABLE (Mils)	
	M60-MMG (M122 mount)	S-MMG (M2 mount)	M60- MMG	S-MMG
Elevation, controlled	260	264	260	264
Elevation, free	478	330	445	300
Depression, controlled	217	215	217	215
Depression, free	521	634	490	600
Traverse, controlled	1,119	1,102	975	975
Traverse, free	6,400	6,400	6,400	6,400
Traversing Bar, left traverse, graduations	425	425		
Traversing Bar, right traverse, graduations	450	450		
Traversing handwheel, total graduations	100	100		

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2.9.3.4 (C) The times to shift from one target to another and the results of firing using predetermined fire techniques are listed in Table 7-15, Sub-Test No 7, Defense, Day and Night.

2.9.3.5 (C) One M2 tripod mount had no graduations on the traversing bar.

2.9.3.6 (C) The free play in the traversing and elevating mechanisms of the M60-MMG and S-MMG varied from mechanism to mechanism and depended largely on how securely the test soldiers tightened the mechanism. A steady firing position by the firer eliminated much of the free play. During Sub-Test No 7, Defense, Day and Night, the M60-LMG and S-LMG achieved a higher score than the M60-MMG and S-MMG respectively.

## 2.9.4 (C) ANALYSIS (U)

2.9.4.1 (C) Both the M60 and Code S machine guns have the capability of being used as hand-carried weapons fired from supported positions, and as ground mounted machine guns on sustained fire mounts.

2.9.4.2 (C) While the capability as fixed or semi-fixed machine guns mounted on selected combat wheeled and tracked vehicles was not tested, it is the opinion of the test officer that suitable mounts could be fabricated to provide the capability of firing from all types of vehicles with both the Code S and M60 machine guns.

2.9.4.3 (C) The maximum free horizontal and vertical movement and the controlled horizontal and vertical movement of the M60-MMG and S-MMG are adequate and comparable.

2.9.4.4 (C) Although the results of testing indicated that the free play in the traversing and elevating mechanisms of both the M60-MMG and S-MMG is generally greater than desired, the effect of free play depends largely on the firer, and is comparable for the M60-MMG and S-MMG.

## 2.9.4.5 (C) Shortcoming (U)

Code S Machine Gun:

The lack of graduations on the traversing bar of one M2 Tripod mount

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## 2.10 (C) SUB-TEST NO 10. RECORD AND TRANSITION FIRING (U)

### 2.10.1 (C) OBJECTIVES (U)

#### 2.10.1.1 (C) Rifles and Carbines (U)

##### General

To evaluate the candidate rifles and carbines in terms of effectiveness achieved on the Record Marksmanship Course (Reference 40, Appendix I).

#### 2.10.1.2 (C) Automatic Rifles and Light Machine Guns (U)

##### General

To evaluate the candidate automatic rifles and light machine guns in terms of effectiveness achieved on the machine gun transition firing range (Reference 40, Appendix I).

### 2.10.2 (C) METHOD (U)

#### 2.10.2.1 (C) Rifles and Carbines (U)

Each group of test soldiers fired their assigned candidate rifles or carbines through the Record Marksmanship Course. Record fire scores were recorded and compared by weapon type for effectiveness.

#### 2.10.2.2 (C) Automatic Rifles (U)

The candidate automatic rifles were fired over the machine gun transition firing range in a manner similar to that conducted with the candidate light machine guns (ref para 2.10.2.3). A comparison of scores achieved by the candidate automatic rifles was made with the scores obtained with the candidate light machine guns.

#### 2.10.2.3 (C) Machine Guns (U)

Ten combat-equipped test soldiers fired each type candidate light machine gun over a field firing course similar to the transition firing course described in paragraphs 159-160, FM 23-67, using 4-1 mix of ball and tracer, and 4-1 mix of duplex and tracer ammunition. Light machine gun results were compared with the candidate automatic rifle results.

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## 2.10.3 (C) RESULTS (U)

### 2.10.3.1 (C) Rifles (U)

The effectiveness of the candidate rifles on the Record Fire Course is indicated in Table 10-1.

TABLE 10-1

#### RECORD MARKSMANSHIP COURSE

##### RIFLES

WPN	AVG SCORE	HIGH INDV SCORE	EX	SS	MK	UNQ	M14 AVG SCORE	M14 HIGH INDV SCORE	EX	SS	MK	UNQ
GP-I C-R	45.6	61	8	14	8	0	47.0	65	8	18	4	0
GP-II XM16E1	42.2	61	8	13	9	0	47.3	67	11	13	5	1
GP-III H-R	45.3	62	11	10	8	1	53.5	76	19	6	5	0
GP-IV A-R	45.3	70	9	13	7	1	50.4	67	15	9	6	0

EX - Expert

MK - Marksman

SS - Sharpshooter

UNQ - Unqualified

### 2.10.3.2 (C) Carbines (U)

The effectiveness of the candidate carbines on the Record Fire Course is indicated in Table 10-2.

TABLE 10-2

#### RECORD MARKSMANSHIP COURSE

##### CARBINES

WPN	AVG SCORE	HIGH INDIV SCORE	EX	SS	MK	UNQ
M14	55.1	79	23	3	4	0
S-C	46.1	63	11	11	7	1
C-MG	41.5	57	19	10	7	4

EX - Expert

MK - Marksman

SS - Sharpshooter

UNQ - Unqualified

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## 2.10.3.3 (C) Automatic Rifles and Machine Guns (U)

The results of transition firing are indicated in Table 10-3.

TABLE 10-3

### TRANSITION FIRING

#### AUTOMATIC RIFLES AND LIGHT MACHINE GUNS

FIRER NO	AUTOMATIC RIFLES				MACHINE GUNS		
	M14E2 4 Ball: 1 Tracer	M14E2 4 Dupl: 1 Tracer	C-AR 4 Ball: 1 Tracer	C-AR 4 Ball: 1 Tracer	M60-LMG 4 Ball: 1 Tracer	M60-LMG 4 Dupl: 1 Tracer	S-LMG 4 Ball: 1 Tracer
2	40	50	50	30	80	70	70
4	40	10	50	70	80	60	80
5	50	50	30	70	60	60	40
6	60	40	40	50	50	50	50
8	50	60	20	60	50	70	60
9	70	60	40	30	60	50	10
11	10	30	30	40	40	50	30
12	10	60	50	60	70	60	70
13	60	30	60	50	70	70	50
14	10	30	20	40	80	70	40
AVG	40	42	39	50	64	61	50

NOTE: Maximum score in this exercise was 80 points for each repetition.

## 2.10.4 (C) ANALYSIS (U)

Not Applicable.

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## 2.11 (C) SUB-TEST NO 11, SIGNATURE CHARACTERISTICS (U)

### 2.11.1 (C) OBJECTIVES (U)

#### 2.11.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

Specific

To evaluate (ref para 6a and 6b, Part I, App III):

a. Firer exposure as a result of weapon configurations when firing point type ammunition from prone or foxhole positions.

b. Signature effects (smoke, blast, reflections) of the weapon (point) when firing all types of (point) ammunition under daylight/night conditions.

#### 2.11.1.2 (C) Machine Guns (U)

Specific

To evaluate:

a. Firer exposure as a result of weapon configuration when firing from bipod and tripod from prone or gun emplacement positions. (Ref para 5a, Part II, App III.)

b. Signature effects (smoke, flash, blast, reflection) of the weapon when firing all types of ammunition under day and night conditions. (Ref para 5b, Part II, App III.)

### 2.11.2 (C) METHOD (U)

#### 2.11.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.11.2.1.1 (C) Test soldiers equipped with the candidate automatic rifles were observed and photographed while in the prone firing and foxhole firing positions. Firer exposure was determined.

2.11.2.1.2 (C) Throughout all sub-tests, particular attention was given to the determination of daylight rifle signature effects (smoke, flash, blast, and reflection). During Sub-Test No 7, Defense, Day and Night, conducted at night, the signature effect of flash was determined.

2.11.2.1.3 (C) Three observers were placed every 100 meters down range to a distance of 600 meters and the candidate rifles, carbines, and automatic rifles were fired using ball and tracer ammunition.

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Observers recorded the signature effects of smoke, flash, blast, reflection, and noise. The exercise was conducted in daylight and darkness.

2.11.2.1.4 (C) At the request of USATECOM (ref 39, App I) a CR propellant (cool-burning powder) ammunition was tested in the C-SMG to determine if this would reduce the flash and sound levels from those obtained when firing ball-type propellant. The method used was as follows:

a. Each of 10 test soldiers fired 20 rounds of CR propellant cartridges in the C-SMG, 10 rounds in the semiautomatic mode, and 10 rounds in the full automatic mode during daylight and darkness. This exercise was repeated using standard ball-type propellant 5.56-mm ammunition and using the M14E2 with ball ammunition (this weapon has high flash and sound levels) as a comparison weapon-ammunition system.

b. During the firing exercises, two observers were positioned: one 50 meters to the left and one 50 meters to the right of each firer. The observers and firers noted and recorded the relative flash and noise of the weapons.

## 2.11.2.2 (C) Machine Guns (U)

2.11.2.2.1 (C) Test soldiers equipped with the candidate machine guns were observed and photographed while in the prone and foxhole positions. Firer exposure was determined.

2.11.2.2.2 (C) Three observers were placed every 100 meters down range out to a distance of 600 meters and the candidate machine guns were fired using ball, tracer, and 4-1 mix of ball and tracer ammunition. Observers recorded the signature effects of smoke, flash, blast, reflection, and noise. The exercise was conducted in daylight and darkness.

## 2.11.3 (C) RESULTS (U)

### 2.11.3.1 (C) Rifles (U)

2.11.3.1.1 (C) Firer exposure with the candidate rifles as a result of rifle configurations is indicated in figures 24 and 25, Appendix V.

2.11.3.1.2 (C) Observations of the signature effects associated with the candidate rifles out to 600 meters are indicated in Table 11-1.

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TABLE 11-1  
RANGE TO WHICH SIGNATURE EFFECTS WERE OBSERVED (Meters)

RIFLES

WEAPON	AMMO	D A Y												N I G H T												
		Semiautomatic						Automatic						Semiautomatic						Automatic						
		N	S	F	B	R	N	S	F	B	R	N	S	F	B	R	N	S	F	B	R	N	S	F	B	R
M14	M80	600	200	0	100	0	600	400	0	100	0	600	0	200	0	600	0	100	0	0	600	0	100	0	0	0
M14	M62	600	200	0	100	0	600	400	0	100	0	600	0	400	0	600	0	400	0	0	600	0	400	0	0	0
M14	M198	600	200	0	100	0	600	300	0	100	0	600	0	200	0	600	0	200	0	0	600	0	200	0	0	0
S-R	M193	600	200	0	100	0	600	200	0	100	0	600	0	200	0	600	0	200	0	0	600	0	200	0	0	0
S-R	M196	600	200	0	100	0	600	300	0	100	0	600	0	400	0	600	0	400	0	0	600	0	400	0	0	0
XM16E1	M193	600	200	0	100	0	600	300	0	100	0	600	0	200	0	600	0	200	0	0	600	0	200	0	0	0
XM16E1	M196	600	200	0	100	0	600	300	0	100	0	600	0	400	0	600	0	400	0	0	600	0	400	0	0	0
H-R	M193	600	100	0	100	0	600	200	0	100	0	600	0	200	0	600	0	200	0	0	600	0	200	0	0	0
H-R	M196	600	100	0	100	0	600	300	0	100	0	600	0	400	0	600	0	400	0	0	600	0	400	0	0	0
A-R	M193	600	200	0	100	0	600	300	0	100	0	600	0	200	0	600	0	200	0	0	600	0	200	0	0	0
A-R	M196	600	200	0	100	0	600	300	0	100	0	600	0	400	0	600	0	400	0	0	600	0	400	0	0	0

LEGEND: N - Noise      S - Smoke      F - Flash      B - Blast      R - Reflection

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2.11.3.1.3 (C) Only tracer ammunition with all candidate rifles produced sufficient flash to be photographed at night.

## 2.11.3.2 (C) Carbines (U)

2.11.3.2.1 (C) Firer exposure with the candidate carbines as a result of carbine configurations is indicated in figure 26, Appendix V.

2.11.3.2.2 (C) Observations of signature effects associated with candidate carbines out to 600 meters are indicated in Table 11-2.

2.11.3.2.3 (C) The C-SMG produced significantly more flash with ball and tracer ammunition than the other candidate carbines. Photographs at figure 27, Appendix V, show the C-SMG firing ball ammunition at night.

2.11.3.2.4 (C) Consensus of firers and observers with respect to reduction of flash and noise levels of the C-SMG by use of the CR propellant cartridges was as follows:

a. In daylight, flash was reduced by a significant amount, and was comparable to that of the M14E2; noise was slightly less than that of the M14E2.

b. In darkness, flash was reduced by a significant amount but was slightly greater than that of the M14E2; noise was slightly less than that of the M14E2.

## 2.11.3.3 (C) Automatic Rifles (U)

2.11.3.3.1 (C) Firer exposure with the candidate automatic rifles as a result of automatic rifle configurations is indicated in figure 28, Appendix V.

2.11.3.3.2 (C) Observations of signature effects associated with the candidate automatic rifles out to 600 meters are indicated in Table 11-3 and figures 29 through 31, Appendix V.

## 2.11.3.4 (C) Machine Guns (U)

2.11.3.4.1 (C) Firer exposure with the candidate machine guns as a result of machine gun configurations is indicated in figures 32 through 35, Appendix V.

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TABLE 11-2  
RANGE TO WHICH SIGNATURE EFFECTS WERE OBSERVED (Meters)  
CARBINES

WEAPON	AMMO	D A Y						N I G H T												
		Semiautomatic			Automatic			Semiautomatic			Automatic									
		N	S	F	B	R	N	S	F	B	R	N	S	F	B	R				
M14	M80	600	200	0	100	0	600	300	0	100	0	600	0	300	0	600	0	200	0	0
M14	M62	600	200	0	100	0	600	400	0	100	0	600	0	400	0	600	0	500	0	0
M14	M198	600	200	0	100	0	600	300	0	100	0	600	0	200	0	600	0	300	0	0
S-C	M193	600	200	100	100	0	600	300	100	100	0	600	0	300	0	600	0	400	0	0
S-C	M196	600	200	100	100	0	600	400	100	100	0	600	0	400	0	600	0	500	0	0
C-SMG	M193	600	300	400	100	0	600	500	500	100	0	600	0	600	0	600	0	600	0	0
C-SMG	M196	600	300	400	100	0	600	500	500	100	0	600	0	600	0	600	0	600	0	0

LEGEND: N - Noise      S - Smoke      F - Flash      B - Blast      R - Reflection

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TABLE 11-3  
RANGE TO WHICH SIGNATURE EFFECTS WERE OBSERVED (Meters)

**AUTOMATIC RIFLES**

**AUTOMATIC FIRE**

WEAPON	AMMO	DAY					NIGHT				
		N	S	F	B	R	N	S	F	B	R
M14E2	M80	600	600	400	400	200	600	0	300	0	0
M14E2	M62	600	600	600	300	200	600	0	600	0	0
M14E2	M198	600	600	500	400	500	600	0	400	0	0
C-AR	M193	600	600	500	400	200	600	0	400	0	0
C-AR	M196	600	600	500	400	200	600	0	400	0	0
S-AR	M193	600	600	600	300	500	600	0	600	0	0
S-AR	M196	600	500	500	500	200	600	0	500	0	0

LEGEND: N - Noise S - Smoke F - Flash B - Blast R - Reflection

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2.11.3.4.2 (C) The ranges out to 600 meters, at which signature characteristics of the M60 and Code S machine guns, firing three types of ammunition, were observed are listed in Table 11-4.

TABLE 11-4

RANGE TO WHICH SIGNATURE EFFECTS WERE OBSERVED (Meters)

## MACHINE GUNS

WEAPON	AMMO	D A Y					N I G H T				
		N	S	F	B	R	N	S	F	B	R
M60	M80	600	400	0	600	0	600	0	400	0	0
M60	M62	600	400	300	600	0	600	0	500	0	0
M60	4-1	600	400	300	600	0	600	0	500	0	0
Code S	M193	600	300	0	500	0	600	0	300	0	0
Code S	M196	600	400	0	500	0	600	0	600	0	0
Code S	4-1	600	400	0	500	0	600	0	500	0	0

LEGEND: N - Noise S - Smoke F - Flash B - Blast R - Reflection

2.11.3.4.3 (C) Photographs were made at night of an M60-MMG and an S-MMG firing a 6-round burst of ball, tracer, and 4-1 mix of ball and tracer ammunition. Only the tracer ammunition with all the candidate machine guns produced sufficient flash to photograph (ref Fig 36, App V).

### 2.11.4 (C) ANALYSIS (U)

#### 2.11.4.1 (C) Rifles (U)

2.11.4.1.1 (C) Firer exposure as a result of rifle configuration when firing point type ammunition from the prone or foxhole position is acceptable and comparable with all rifles. The firer exposure of the candidate rifles with bipod produces a higher silhouette than the candidate rifles without bipod. However, the difference in firer exposure of the candidate rifles with or without bipods is not significant.

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2.11.4.1.2 (C) Signature effects of all candidate automatic rifles when firing all types of (point) ammunition under daylight/night conditions are acceptable and comparable.

2.11.4.1.3 (C) During daylight firing, the observation of flash, blast, and reflection of the candidate rifles is considered negligible. The candidate rifles produce more smoke in the automatic mode than the semiautomatic mode of fire. The M14 produces the greatest amount of smoke. The H-R produces the least amount of smoke.

2.11.4.1.4 (C) The differences in signature effects and firer exposure of the candidate rifles are not significant.

## 2.11.4.2 (C) Carbines (U)

2.11.4.2.1 (C) Firer exposure as a result of carbine configuration when firing point type ammunition from the prone or foxhole position is acceptable and comparable with all carbines.

2.11.4.2.2 (C) Signature effects of the M14 and S-C when firing all types of (point) ammunition under daylight/night conditions are acceptable and comparable.

2.11.4.2.3 (C) The C-SMG produces unacceptable flash and noise with ball and tracer ammunition.

2.11.4.2.4 (C) By use of CR propellant cartridges, the flash and noise levels of the C-SMG are reduced to acceptable levels.

## 2.11.4.3 (C) Automatic Rifles (U)

2.11.4.3.1 (C) Firer exposure as a result of automatic rifle configuration, when firing point type ammunition from the prone or foxhole position, is acceptable and comparable with all automatic rifles. (Fig 28, App V.)

2.11.4.3.2 (C) Signature effects of the C-AR and S-AR when firing all types of (point) ammunition under daylight/night conditions are acceptable and comparable. The muzzle flash of the M14E2 firing the M62 cartridge is excessive.

## 2.11.4.4 (C) Machine Guns (U)

2.11.4.4.1 (C) Firer exposure as a result of machine gun configuration when firing point type ammunition from the prone or foxhole position is acceptable and comparable with all machine guns. However, the test soldiers produce higher silhouettes with the M60 machine guns than with the Code S machine guns. This is not significant.

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2.11.4.4.2 (C) Signature effects of the candidate machine guns when firing all types of (point) ammunition under daylight/night conditions are acceptable and comparable for the M60 and Code S machine guns.

2.11.4.5 (C) No attempt should be made to correlate results of different types of weapons, since testing for each group of candidate weapons was accomplished on different days and nights and under different light conditions.

2.11.4.6 (C) Deficiencies of the Candidate Weapons (U)

C-SMG:

a. Excessive flash produced with ball and tracer ammunition. (This deficiency is eliminated by use of CR propellant cartridges.)

b. Excessive noise level. (This deficiency is eliminated by use of CR propellant cartridges.)

2.11.4.7 (C) Shortcoming of the Candidate Weapons (U)

M14E2:

Excessive flash produced with tracer ammunition.

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## 2.12 (C) SUB-TEST NO 12, POINTED FIRE ACCURACY (U)

### 2.12.1 (C) OBJECTIVE (U)

#### Rifles, Carbines, and Automatic Rifles

To determine the relative effectiveness of each weapon in the following target situation: quick fire at the shorter ranges (25-150 meters) using both pointed and aimed fire techniques, time to fire first round and second round on same target, and time to engage a second target (ref para 4b(6), Part I, App III).

### 2.12.2 (C) METHOD (U)

#### Rifles, Carbines, and Automatic Rifles

2.12.2.1 (C) The test soldiers were trained in quick-fire techniques using the M14, and each fired a familiarization quick-fire exercise with the candidate weapons assigned to him.

2.12.2.2 (C) The candidate rifles, carbines, and automatic rifles were fired through a quick-fire course, firing at short exposure time (pop-up) targets located at 40, 80, and 150 meters from the firing point. Targets were randomly presented: Exposure time was 2 and 4 seconds; the firer was not limited in the amount of ammunition fired; however, firing was permitted only when targets were presented. The semiautomatic and automatic modes of fire were used, except the candidate automatic rifles were not fired semiautomatically. Rounds fired, targets hit, target hits, and time to fire were recorded. Hit capability was computed. The exercise was conducted once using pointed fire, and once using aimed fire.

### 2.12.3 (C) RESULTS (U)

#### 2.12.3.1 (C) Rifles (U)

A summary of pointed and aimed fire accuracy results is reflected in Table 12-1. A detailed listing of results is included in Charts 12-1 and 12-2, Appendix II. (Charts reflect average of one target at each range.) Times to fire the second round on a target and time to engage a second target were not determined as the instrumentation equipment was not adequate to accurately measure these times. Time to fire the first round and average time to fire a round were computed.

#### 2.12.3.2 (C) Carbines (U)

2.12.3.2.1 (C) A summary of pointed and aimed fire accuracy results is reflected in Table 12-2. A detailed listing of results is included in Charts 12-3 and 12-4, Appendix II.

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TABLE 12-2  
POINTED FIRE ACCURACY  
CARBINES

Summary of All Ranges

SEMI-AUTOMATIC													
POINTED							AIMED						
Rds	Tgt	HC	Tgts	H/TP	T	Rds/Sec	Rds	Tgt	HC	Tgts	H/TP	T	Rds/Sec
Fired	Hits		Hit	PTH			Fired	Hits		Hit	PTH		
WPN	38.0	2.3	6.1	1.8	22.5	1.0	21.1	3.2	15.2	2.6	32.5	2.4	0.5
M14	52.8	3.4	6.4	2.1	26.2	1.4	24.0	5.3	22.1	3.2	40.0	2.3	0.6
S-C	45.2	2.6	5.8	1.9	23.8	1.0	27.0	3.3	12.2	2.6	32.5	2.0	0.6
C-SMG													

AUTOMATIC													
POINTED							AIMED						
Rds	Tgt	HC	Tgts	H/TP	T	Rds/Sec	Rds	Tgt	HC	Tgts	H/TP	T	Rds/Sec
Fired	Hits		Hit	PTH			Fired	Hits		Hit	PTH		
M14	55.9	2.4	4.3	1.8	22.5	1.3	49.2	3.6	7.3	2.5	31.2	1.9	1.1
S-C	68.9	3.9	5.7	2.1	26.2	1.5	57.9	4.9	8.5	3.1	38.8	2.0	1.3
C-SMG	78.4	3.0	3.8	2.1	26.2	1.9	74.1	3.2	4.3	2.5	31.2	2.0	1.8

LEGEND:  
HC - Hit Capability  
PTH - Percentage Targets Hit  
H/TP - Targets Hits per Trigger Pull  
T - Average Time to Engage a Target  
Rds/Sec - Rounds per Second

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TABLE 12-3

POINTED FIRE ACCURACY  
AUTOMATIC RIFLES

Summary of all Ranges:

	P O I N T E D										A I M E D									
	Rds		Tgt		Tgts		H/		Rds/		Rds		Tgt		Tgts		H/		Rds/	
	Fired	Hits	HC	Hit	PTH	TP	T	Sec	Fired	Hits	HC	Hit	PTH	TP	T	Sec				
WPN	57.7	2.5	4.3	1.8	22.5	0.1	1.8	2.7	48.7	3.6	7.4	2.3	28.8	0.2	2.2	2.3				
M14E2	73.6	3.4	4.6	1.8	22.5	0.1	1.9	3.5	57.7	5.7	9.9	3.3	41.3	0.3	2.2	2.7				
C-AR	73.3	5.3	7.2	2.6	32.5	0.2	2.0	3.5	54.7	6.1	11.2	3.7	46.3	0.3	2.5	2.6				
S-AR																				

LEGEND:

- HC - Hit Capability
- PTH - Percentage of Targets Hit
- H/TP - Hits per Trigger Pull
- T - Average Time to Engage a Target
- Rds/Sec - Rounds per Second

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2.12.3.2.2 (C) Data recording equipment used in the conduct of this sub-test was not capable of determining the time to fire the second round on a target, or the time to engage a second target.

## 2.12.3.3 (C) Automatic Rifles (U)

A summary of the results of pointed and aimed fire accuracy firing is reflected in Table 12-3. A detailed chart of automatic rifle results is included in Chart 12-5, Appendix II.

## 2.12.4 (C) ANALYSIS (U)

### 2.12.4.1 (C) Rifles (U)

2.12.4.1.1 (C) The relative effectiveness of all the candidate rifles, except the XM101, is comparable in the semiautomatic, automatic, aimed and pointed fire accuracy roles. The XM101 is significantly less effective in the semiautomatic, pointed fire role.

2.12.4.1.2 (C) In comparing the relative effectiveness between aimed and pointed fire with the candidate rifles, the results indicate that in all situations the following occurred: aim capability of aimed fire was significantly greater than pointed fire, time to engage the target for aimed fire was significantly greater than pointed fire, and number of rounds fired with aimed fire was significantly less than pointed fire. In aimed fire, the firer takes more time to engage the target and receives more hits per rounds fired, but with pointed fire the firer can engage the target quicker and get off a greater number of rounds. The instrumentation used in this sub-test was not capable of recording which round in a burst hit the target. Therefore, it is not possible to show how many rounds it took the firer to hit the target.

### 2.12.4.2 (C) Carbines (U)

2.12.4.2.1 (C) The S-C is significantly more effective in the semiautomatic, automatic, aimed and pointed fire accuracy roles.

2.12.4.2.2 (C) In comparing the effectiveness between aimed and pointed fire with the candidate carbines, the analysis in paragraph 2.12.4.1.2 is confirmed.

### 2.12.4.3 (C) Automatic Rifles (U)

2.12.4.3.1 (C) The S-AR is significantly more effective in the automatic, pointed and aimed fire accuracy role.

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2.12.4.3.2 (C) Aimed fire is significantly better than pointed fire with respect to HC and HTP for each of the candidate automatic rifles. However, it should be pointed out that test soldiers take longer to get off the first round or burst when delivering aimed fire and that significantly less rounds are fired when delivering aimed fire. The most significant factor in comparing pointed to aimed fire is the time to hit the target with the first round and this could not be measured with the instrumentation available for this test.

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## 2.13 (C) SUB-TEST NO 13, PORTABILITY AND AERIAL DELIVERY (U)

### 2.13.1 (C) OBJECTIVE (U)

#### 2.13.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

##### 2.13.1.1.1 (C) To determine (ref para 3b(6), Part I, App III):

a. Relative comfort to carry and fire, to include projections which can readily entangle in brush, grass, or battlefield obstacles.

b. Suitability of being carried while debarking from amphibious shipping via debarkation nets.

c. Suitability of being carried while getting in and out of aircraft, vehicles, and APC's.

d. Suitability for aerial delivery by individual parachutists.

##### 2.13.1.1.2 (C) To evaluate the suitability of accepting a carrying sling in a conventional manner.

#### 2.13.1.2 (C) Machine Guns (U)

##### Specific

##### 2.13.1.2.1 (C) To determine (ref para 1b(6), Part II, App III):

a. Relative ease to carry and fire, to include a minimum of projections which could entangle in battlefield obstacles.

b. Suitability of weapon and mount being delivered by the individual parachutist.

c. Suitability of carrying weapon and ammunition containers while debarking from amphibious shipping via debarkation nets.

d. Suitability of carrying while getting in and out of aircraft, vehicles, and APC's.

##### 2.13.1.2.2 (C) To evaluate suitability of accepting a carrying sling and carrying handle. (Ref para 1b(6), Part II, App III.)

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## 2.13.2 (C) METHOD (U)

### 2.13.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.13.2.1.1 (C) Throughout all sub-tests, data bearing on portability were recorded.

2.13.2.1.2 (C) Data pertaining to subparagraph 2.13.1.1.1a above were collected during Sub-Test No 8, Assault, Day and Night.

2.13.2.1.3 (C) A platform 34 feet in height was constructed and a debarkation net hung over the side. Fifteen combat-equipped riflemen from each test group of 30 test soldiers descended the debarkation net from the platform, simulating debarkation from a troop ship to assault boats. Test soldiers alternately descended with each type candidate rifle. Suitability of the weapon being carried while debarking was determined.

2.13.2.1.4 (C) One infantry rifle squad from each test group, equipped with their appropriate type candidate rifle, was loaded aboard aircraft (CV-2 and UH-1B), vehicles (Truck, Cargo, 2½-Ton, and APC's (M113)) and unloaded. Any difficulties encountered in loading or unloading were recorded.

2.13.2.1.5 (C) The candidate rifles, carbines and automatic rifles were examined and the most suitable means of attaching them to the individual parachutist were determined. Three of each type weapon were jumped five times by parachutists from aircraft. The weapons were examined for damage after each parachute jump, and parachutists were questioned concerning difficulties encountered during exit from the aircraft, descent, and recovery on the ground. Suitability for aerial delivery of the weapons by the individual parachutist was determined.

2.13.2.1.6 (C) To determine the relative ease in carrying the candidate rifles, carbines, and automatic rifles, the test soldiers participated in three cross-country marches of 3 miles each. The terrain through which the test soldiers traveled consisted of steep grades, open fields, heavily vegetated areas, high grass and brush, hard-top road surfaces, and swampy areas. Also included in each march were simulated combat situations where the test soldiers were required to hit the ground and position themselves for an assault. The test soldiers were also required to negotiate a water obstacle, traveling through chest-high water for 40 yards. During this portion of the exercise, the candidate weapons were sometimes completely submerged in the water, and were exposed to the effects of sand and mud.

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## 2.13.2.2 (C) Machine Guns (U)

2.13.2.2.1 (C) Upon completion of Sub-Test No 8, Assault, Day and Night, each test soldier was questioned separately as to the comparative ease with which the candidate machine guns were carried, and as to any difficulties encountered. Particular attention was given to determining any projections which could entangle in battlefield obstacles. The ease of firing the candidate machine guns while they were being carried was noted.

2.13.2.2.2 (C) The candidate machine guns were attached to the parachutist to determine the best means of carry by the parachutist. Three of each type candidate machine gun, packed and worn in the manner deemed most suitable, were jumped five times by combat-equipped parachutists. The candidate machine guns were inspected prior to and after jumping and, if determined by visual inspection to be safe, were test fired after the jump. Breakage, malfunctions, and other related data were recorded. All parachutists were questioned as to the compatibility of the test machine guns with other equipment.

2.13.2.2.3 (C) A platform 34 feet in height was constructed and a debarkation net hung over the side. Six combat-equipped machine gun crews were instructed in "dry net" drill. Each team was then required to raise and lower each type of candidate machine gun from the platform. The test soldiers were then interrogated as to the comparative suitability of the candidate machine guns in this exercise.

2.13.2.2.4 (C) One infantry weapons squad (TOE 7-18E) equipped with each type of candidate machine gun was loaded in a helicopter, a 2½-ton truck, and an M113 personnel carrier. Any difficulties encountered in loading or unloading were recorded.

2.13.2.2.5 (C) During the conduct of this and all other sub-tests, particularly Sub-Test No 8, Assault, Day and Night, the suitability of the candidate machine guns to accept a carrying sling was evaluated, as well as ease of carrying in the slung position. The suitability of the carrying handles of the candidate machine guns was evaluated.

## 2.13.3 (C) RESULTS (U)

### 2.13.3.1 (C) Rifles (U)

2.13.3.1.1 (C) The 5.56-mm candidate rifles were easiest to carry during a cross-country portability exercise. When questioned as to the comparative ease of portability with the candidate rifles, the test soldiers indicated that all of the 5.56-mm candidate rifles were easier to carry than the M14 rifles because the 5.56-mm rifle were

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lighter, smaller, and had less tendency to become entangled in brush and the soldier's web equipment. The advantages of the carrying handle of the XM16E1 were noted for control of the rifle in moving through thick brush. For limited portions of the cross-country march where the stock of the A-R was folded, it was easier to handle than the other candidate rifles. While carrying the candidate rifles at sling arms, the H-R was more convenient because of the sling attachment to the side of the rifle.

2.13.3.1.2 (C) The M14 and H-R were easier to carry with the bipod attached because their bipods could be folded. However, the S-R, XM16E1, and A-R possessed quick attachable and detachable bipods which showed no apparent disadvantage when compared to the folding bipod which remained on the rifle.

2.13.3.1.3 (C) The 5.56-mm candidate rifles were easier to use while the test soldier was moving to engage targets and fire because of their size and lightness.

2.13.3.1.4 (C) In ascending and descending a cargo net, loading, being transported, or unloading from aircraft, vehicles, and armored personnel carriers, the test soldiers equipped with the 5.56-mm candidate rifles had less difficulty. The A-R with the folded stock was noted to have a definite advantage in these exercises because of its reduced length.

2.13.3.1.5 (C) The most suitable means of attaching the candidate rifles to the individual parachutist are indicated in Figures 37 through 43, Appendix V.

2.13.3.1.6 (C) There were no significant difficulties encountered with any of the candidate rifles during aerial delivery with the individual parachutist. No damage was incurred by any of the candidate rifles during the parachute jumps. The most suitable means of rigging for delivery on the individual parachutist for all candidate rifles were with the rifle packed in the Case, Individual Weapon, Parachutist. All of the candidate rifles could be suitably rigged for the individual parachutist as follows:

a. XM16E1. Slung on the left shoulder, muzzle up with the sling lengthened to lower the muzzle as low as possible. The muzzle and front sight should be taped. The bolt assist device should be padded and the magazine taped into the rifle. Two ties should be used, one to the diagonal backstrap and one to the main lift web. (Fig 40, App V.)

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b. S-R. Slung on left shoulder, muzzle up; the muzzle should be padded and the sling lengthened to lower the muzzle as low as possible. For testing, the stock was detached from the rifle and taped to the outside of the receiver since it was the opinion of the test officer that the stock is not strong enough for the rifle to be jumped in the normal manner. The magazine should be taped into the rifle. Two ties should be used, one to the diagonal backstrap and one to the main lift web. (Fig 41, App V.)

c. H-R. Slung on the left shoulder with the sling passed around the rifle barrel, and lengthened to lower the muzzle as low as possible. The muzzle should be taped. The magazine should be taped into the rifle. A lower leg tie may be used if desired; however, it was not considered necessary. Two other ties should be used, one to the diagonal backstrap and one to the main lift web. (Fig 42, App V.)

d. A-R. Slung on the left shoulder, muzzle up with the sling lengthened to lower the muzzle as low as possible. The front sight and muzzle should be taped. The hinge of the folding butt stock should be padded and taped as the hinge protrudes, and is a potential hazard to the jumper if he were to execute a left-side parachute landing fall. The magazine should be taped into the rifle. Two ties should be used, one to the diagonal backstrap and one to the main lift web. (Fig 43, App V.)

## 2.13.3.2 (C) Carbines (U)

2.13.3.2.1 (C) With respect to portability, all candidate carbines were suitable however the S-C and C-SMG were more portable than the M14 under the following test conditions:

- a. Moving through brush, grass, and battlefield obstacles.
- b. Descending from simulated troop ship via debarkation net.
- c. Loading and unloading from vehicles, APC's, and aircraft.

2.13.3.2.2 (C) The S-C was rigged for jumping in a similar manner to the S-R, as described in paragraph 2.13.3.1.5d, with the same remarks about the S-R being pertinent to the S-C. (Fig 44, App V.)

2.13.3.2.3 (C) The C-SMG was slung on the left shoulder with the sling lengthened to lower the muzzle and the stock telescoped, with the bolt assist device padded and taped. Front sights should be taped and two ties used, one to the diagonal backstrap and one to the main lift web. (Fig 45, App V.)

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2.13.3.2.4 (C) The hinge on the folding butt stock of the S-C should be padded and taped. While executing parachute landing falls, several parachutists fell on the S-C, and remarked that the protruding edges of the swing hinges, exposed by folding the stock, exerted painful pressure upon their hip at impact.

2.13.3.2.5 (C) The S-C and C-SMG used in the aerial delivery portions of this sub-test were examined, function fired, and were found to perform satisfactorily.

2.13.3.2.6 (C) One S-C sustained minor damage resulting from aerial delivery. The lower sling swivel broke from the butt stock.

## 2.13.3.3 (C) Automatic Rifles (U)

2.13.3.3.1 (C) Seven of the test soldiers stated that the M14E2 presented little or no difficulty in traveling cross-country with respect to its catching on vines, brush, branches, or other foliage. Four firers stated that the M14E2 did catch on vegetation because of its length. Some of the test soldiers stated that the basic load of the M14E2 was too heavy and was difficult to carry cross-country any considerable distance, and additionally increased the difficulty of negotiating the water obstacle. During function firing after the marches, one M14E2 failed to feed eight times.

2.13.3.3.2 (C) Ten of the test soldiers stated that the C-AR presented little or no difficulty in traveling cross-country with respect to its catching on vines, brush, branches, or other foliage. One test soldier stated that the bipod had a tendency to fall off when traveling through dense vegetation, and when "hitting the ground." It was further stated that the short stock of the C-AR made it difficult to "hit the ground" as quickly as with the M14E2. During function firing after the marches, one C-AR failed to eject.

2.13.3.3.3 (C) Six of the test soldiers stated that they experienced difficulty in carrying the S-AR on the cross-country march. They stated that the bipods had a tendency to fall off or to become entangled in brush and vines. One test soldier stated that the front sight of his S-AR caught in the vegetation.

2.13.3.3.4 (C) It was the opinion of the test officer that the S-AR was not properly balanced for ease of carrying, in that its center of balance was concentrated too far to the front. The short stock of the S-AR made it difficult to "hit the ground" using the stock as is done with the M14E2.

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2.13.3.3.5 (C) During function firing, after exposure to sand, mud, and water on the marches, one S-AR "ran away," then failed to fire; one S-AR failed to eject, then failed to feed, and three S-AR's failed to eject, then double fed.

2.13.3.3.6 (C) The test soldiers experienced only slight difficulty in climbing and descending a debarkation net with the M14E2. Occasionally the muzzle of the M14E2 would become entangled in the debarkation net, requiring the test soldier to pause to free his weapon.

2.13.3.3.7 (C) The test soldiers experienced no difficulty in climbing and descending a debarkation net with either the C-AR or the S-AR.

2.13.3.3.8 (C) The test soldiers stated that the M14E2, due to its length, would sometimes interfere with other test soldiers when loading and unloading from aircraft, vehicles, and APC's. The barrel, or bipod legs when open, tended to catch on the clothing or web gear of other test soldiers and to hit the side of the aircraft, vehicle, or APC.

2.13.3.3.9 (C) The test soldiers stated that the C-AR and the S-AR, with their bipods attached, tended to catch on the clothing and web gear of other test soldiers. When the bipods were not attached, the C-AR and the S-AR did not interfere with other test soldiers.

2.13.3.3.10 (C) It was determined that the best method to rig the C-AR and the S-AR for jumping by the individual parachutist was in the Case, Individual Weapon, Parachutist. (Figs 39 and 46, App V.)

## 2.13.3.4 (C) Machine Guns (U)

2.13.3.4.1 (C) When questioned as to the comparative ease with which the candidate machine guns could be carried, the 11 test soldiers questioned indicated that the Code S machine guns were easier to carry than the M60 machine guns. Reasons given were that Code S machine guns were lighter, smaller, and had less tendency to become entangled in brush, vines, and web equipment.

2.13.3.4.2 (C) While being carried through heavy underbrush one M60 machine gun barrel became unlatched and one Code S machine gun trigger guard became detached from the weapon from contact with the underbrush.

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2.13.3.4.3 (C) The 11 test soldiers indicated that the S-LMG's were easier to fire while being carried than were the M60-LMG's; however, two test soldiers commented that cartridge cases were occasionally ejected into their left sleeve when firing the S-LMG in the assault.

2.13.3.4.4 (C) The best means of jumping the Code S machine guns was with the S-MMG packed in the Parachutist Adjustable Equipment Container (ref Fig 47 and 48, App V), and the S-LMG in the Case, Individual Weapon, Parachutist (ref Fig 39, App V).

2.13.3.4.5 (C) No damage was noted to any of the three S-LMG's jumped and they were fired after the jumps with no noticeable increase in the number of malfunctions. One S-MMG was damaged to such an extent that it could not be fired. The feed cover latch handle was broken off (ref Fig 96 and 97, App V), the windage knob was bent (ref Fig 97, App V), and the feed cover was bent so that it could not be closed (ref Fig 95, 96, and 97, App V).

2.13.3.4.6 (C) No difficulties were encountered in raising or lowering any of the candidate machine guns during the "dry net" drill. The 11 test soldiers questioned stated that the Code S machine guns were easier to raise and lower due to their lighter weight.

2.13.3.4.7 (C) No difficulties were encountered when an infantry weapons squad equipped with each type candidate machine gun loaded in and unloaded from a helicopter, a 2½-ton truck, and an M113 personnel carrier.

2.13.3.4.8 (C) The S-MMG was not capable of accepting a carrying sling since it did not have a forestock assembly. (Fig 10, App V). When questioned as to the relative ease of carrying the candidate machine guns in the slung position, the 11 test soldiers questioned indicated the S-LMG was the easiest to carry due to its lighter weight.

2.13.3.4.9 (C) It was the opinion of the 11 test soldiers used that the carrying handles of the candidate machine guns were suitable for that purpose.

### 2.13.4 (C) ANALYSIS (U)

#### 2.13.4.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.13.4.1.1 (C) All of the candidate rifles are suitable as to portability. However, the 5.56-mm candidate rifles are significantly easier to carry than the M14 in cross-country marches and exercises, debarking from amphibious shipping, and when getting into and out of aircraft, vehicles, and APC's. The A-R, with the stock folded, is the easiest of all to handle in debarking exercises and for getting in and out of aircraft, vehicles, and APC's.

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2.13.4.1.2 (C) The candidate rifles are all considered to be suitable for aerial delivery by individual parachutists.

2.13.4.1.3 (C) All of the candidate rifles are suitable with respect to acceptability of a carrying sling in a conventional manner. The H-R sling system was the most suitable for carrying the rifle in the slung position.

2.13.4.1.4 (C) All of the candidate carbines are suitable with respect to portability. However, the C-SMG and S-C are significantly easier to carry than is the M14 in cross-country marches and exercises, debarking from amphibious shipping, and for getting into and out of aircraft, vehicles, and APC's.

2.13.4.1.5 (C) The candidate carbines are all considered suitable for aerial delivery by individual parachutists.

2.13.4.1.6 (C) The candidate carbines are all suitable for accepting a carrying sling in a conventional manner. The C-SMG is the easiest of the candidate carbines to carry.

2.13.4.1.7 (C) All of the candidate automatic rifles are suitable with respect to portability. The C-AR and the S-AR are significantly easier to carry than the M14E2 on cross-country marches and exercises. However, the C-AR and S-AR bipods, when attached, tend to become disengaged from contact with vegetation and other obstacles. This is undesirable but acceptable, since they can be carried in their bipod carrying case and are quickly attached and detached. In addition, the C-AR and S-AR bipods have a tendency to detach from the automatic rifle when the soldier "hits the ground."

2.13.4.1.8 (C) The candidate automatic rifles are suitable with respect to carrying while debarking from amphibious shipping and getting into and out of aircraft, vehicles, and APC's. The C-AR and S-AR are slightly easier to handle under these conditions than is the M14E2.

2.13.4.1.9 (C) The candidate automatic rifles are considered suitable for aerial delivery by individual parachutists.

2.13.4.1.10 (C) The candidate automatic rifles are suitable with respect to accepting a carrying sling in a conventional manner.

2.13.4.2 (C) Machine Guns (U)

2.13.4.2.1 (C) The candidate machine guns are suitable with respect to portability, with the Code S machine guns being significantly easier to carry and fire than the M60 machine guns due to their smaller size and lesser weight and recoil.

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2.13.4.2.2 (C) The candidate machine guns are suitable for aerial delivery by individual parachutists.

2.13.4.2.3 (C) The candidate machine guns, except the S-MMG, which does not have a forestock to which a front sling swivel can be attached, are suitable for accepting a carrying sling. All of the candidate machine guns have carrying handles which are considered suitable for carrying them for short distances or when the barrels are hot.

2.13.4.2.4 (C) The S-LMG cannot be mounted on the tripod sub-mount assembly with the forestock assembled. Without the forestock assembled, a sling cannot be attached.

2.13.4.3 (C) Deficiency of the Candidate Weapons (U)

S-AR:

The S-AR is unreliable in functioning after exposure to sand, mud, and water.

2.13.4.4 (C) Shortcomings of the Candidate Weapons (U)

C-AR and S-AR:

The C-AR and S-AR bipods tend to become detached too easily when inadvertently struck by low velocity rounds.

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## 2.14 (C) SUB-TEST NO 14, ACCESSORIES AND TRAINING AIDS (U)

### 2.14.1 (C) OBJECTIVES (U)

#### Rifles, Carbines, and Automatic Rifles

#### 2.14.1.1 (C) General (U)

To evaluate the accessories provided with the candidate rifles.  
(Ref 40, App I.)

#### 2.14.1.2 (C) Specific (U)

2.14.1.2.1 (C) To determine the suitability of blank ammunition and blank firing attachments/devices. (Ref para 9, Part I, App III.)

2.14.1.2.2 (C) To evaluate the folding-type bipod, lightweight and readily detachable. (Ref para 3a(8), Part I, App III.)

#### 2.14.2 (C) METHOD (U)

2.14.2.1 (C) Throughout all sub-tests, the candidate rifles with their components and accessories were evaluated. Particular attention was given to determining the suitability of the following:

- a. Combination tool.
- b. Cleaning rod.
- c. Carrying sling.
- d. Bipod.
- e. Other accessories and training aids as provided.

2.14.2.2 (C) During Sub-Test No 13, Portability and Aerial Delivery, the carrying sling was evaluated.

2.14.2.3 (C) Throughout all firing tests where the bipod was used, difficulties encountered were recorded, and upon completion of all tests, a determination as to the suitability of the bipod provided with the candidate rifles was made. Particular attention was given to ease of attaching, adjusting, and detaching the bipod from the rifle.

#### 2.14.3 (C) RESULTS (U)

##### 2.14.3.1 (C) Rifles (U)

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2.14.3.1.1 (C) The combination tool provided for the M14 was used as an offset screwdriver, gas plug wrench, and cleaning rod handle. (Item 5, Fig 52, App V.)

2.14.3.1.2 (C) One combination tool was provided for the 20 S-R's. (Item 3, Fig 57, App V.) It was used as an adjusting tool for the front sight post and as a punch to remove the takedown pins; however, a cartridge could also be used to accomplish both these tasks.

2.14.3.1.3 (C) A sight elevation adjustment tool and a Phillips tip screwdriver were provided with the H-R to make fine adjustments on the elevation and windage of the rear sight. (Item 3, Fig 55, App V.) A cartridge could be used to remove snap pins.

2.14.3.1.4 (C) No combination tool was provided with the XM16E1 or A-R.

2.14.3.1.5 (C) There were no difficulties with cleaning rods provided for the M14. M11 type cleaning rods (Item 1, Fig 54, App V) were provided for the XM16E1 and A-R. No cleaning rods were provided for the S-R and H-R. However, locally available cleaning rods (M11 type) were used. M11 cleaning rods frequently became unserviceable with little use (ref Sub-Test No 15, Maintenance). They mushroomed and flared at the joints and came apart. (Fig 68, App V.)

2.14.3.1.6 (C) The carrying slings provided with the candidate rifles were used without difficulty throughout the test.

2.14.3.1.7 (C) The M2 bipod provided with the M14 was a folding-type bipod with adjustable legs. The bipod required the use of the combination tool for attachment to the rifles. The ground-touching portions of the bipod feet are flat, and they act as skids when moved laterally. (Fig 1, App V.)

2.14.3.1.8 (C) The S-R was provided with a spring-loaded bipod that clamps to the barrel of the rifle without adjustment. It had adjustable legs for height, but could not be folded. It was quickly attached and detached, and was carried in a carrying case attached to the pistol belt when not in use. The bipod leg had a flat foot with a small spike on the outside portion. (Fig 57, App V.)

2.14.3.1.9 (C) The M3 bipod was provided with the XM16E1 and A-R. It was a spring-loaded bipod that clamped to the barrel of the rifle without adjustment. It did not have adjustable legs, nor could it be folded on the rifle. It was quickly attached and detached, and was carried in a carrying case when not in use. The ground-touching portions of this bipod were flared to the outside and had sharp edges which did not easily slide laterally. (Fig 49, App V.)

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2.14.3.1.10 (C) The bipod provided with the H-R was a slip-on, folding-type, nonadjustable bipod with a spring-loaded snap lock. When on the rifle, it was located on the collar below the chamber area of the barrel, forward of the magazine housing. Its ground-touching portions were two large feet with a large triangular spike on the bottom of each foot. The rearward position of the bipod enabled the firer to engage targets with less lateral movement of the rifle and bipod than with the other candidate rifles. However, the feet of the bipod did not easily slide laterally. (Fig 50, App V.)

### 2.14.3.2 (C) Carbines (U)

2.14.3.2.1 (C) Combination tools were available only for the M14; these presented no difficulties. Test firers used cartridge tips to perform adjustments on the S-C and C-SMG which could otherwise be accomplished by a combination tool. (Ref Sub-Test No 15, Maintenance.)

2.14.3.2.2 (C) Cleaning rods were provided with the M14 maintenance package and presented no difficulties. Cleaning rods were not received with either the S-C or C-SMG, but were locally procured (M11 type).

2.14.3.2.3 (C) No difficulties were encountered using standard web slings with the carbine candidates.

2.14.3.2.4 (C) No bipods were received with the S-C and C-SMG.

### 2.14.3.3 (C) Automatic Rifles (U)

2.14.3.3.1 (C) The combination tools provided for the M14E2 and the S-AR presented no difficulty. No combination tool was necessary for the C-AR since the firer could use the tip of a 5.56-mm cartridge to disassemble his C-AR, and to make adjustments to the front and rear sights. Some test soldiers stated that sight adjustment would have been faster and easier had a combination tool been provided for this purpose.

2.14.3.3.2 (C) The cleaning rods issued with the M14E2's presented no difficulties throughout all phases of testing.

2.14.3.3.3 (C) No cleaning rods were furnished with the C-AR or the S-AR. Cleaning rods (M11), available locally, were used.

2.14.3.3.4 (C) The carrying slings issued with the M14E2's presented no difficulties throughout all phases of testing.

2.14.3.3.5 (C) No slings were issued with either the C-AR or the S-AR. The standard sling for the Rifle, 7.62-mm, M14, was procured locally, and used without difficulty with both the C-AR and the S-AR.

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2.14.3.3.6 (C) The bipod issued with the M14E2 (M2 Bipod, Modified) presented no difficulties under all conditions encountered during the test. Its attachment to the M14E2 required the use of the combination tool. Although its attachment required more time than that of the bipods for the C-AR or the S-AR, when once attached it did not become detached when moving through dense vegetation or when "hitting the ground" as did the bipod for the C-AR. (Ref Sub-Test No 13, Portability and Aerial Delivery.) In addition, it was the only folding-type bipod which could be folded back under the barrel of the weapon when not in use. It was adjustable for height. (Figs 3 and 51, App V.)

2.14.3.3.7 (C) The bipods issued with the C-AR (M3 Bipod) and the S-AR (SAR Bipod) were more readily attachable and detachable than was the M2 Bipod, Modified, to the M14E2. However, neither of these bipods folded back under the barrel of the automatic rifle when not in use. The M3 Bipod was not adjustable for height and comments were made by test soldiers that it would have been better had it been adjustable for height since they sometimes had to assume awkward positions which required height adjustments. The S-AR Bipod was adjustable for height. Both the M3 Bipod and the S-AR Bipod had a tendency to become detached or semidetached from the automatic rifle when the firer slid the bipod laterally along the ground. In the portability phase of testing, both the M3 bipod and the S-AR Bipod tended to become detached when traversing dense vegetation or when "hitting the ground." Both of these bipods were provided with a case which permitted their being carried on the pistol belt when not in use. (Figs 49 and 57, App V.)

## 2.14.4 (C) ANALYSIS (U)

### 2.14.4.1 (C) Rifles (U)

2.14.4.1.1 (C) The combination tools for the M14 and the S-R are considered suitable. Since a cartridge can be used in lieu of a combination tool with the XM16E1 and the A-R, the lack of a combination tool for those rifles is acceptable. The special tools for rear sight adjustment and zeroing of the H-R performed satisfactorily but the need for these special items is undesirable.

2.14.4.1.2 (C) The M14 type cleaning rod is suitable. The M11 type cleaning rod is lacking in durability. No cleaning rod was furnished for the S-R and the H-R, but one is needed.

2.14.4.1.3 (C) Slings were evaluated and reported on in Sub-Test No 13, Portability and Aerial Delivery.

2.14.4.1.4 (C) All of the bipods are readily attached and detached, although more time is required to attach and detach the M14 type. This is considered acceptable. Only the M14 type is both adjustable in height and capable of being folded when attached to the rifle. The S-R bipod is adjustable in height, but cannot be folded. The legs of the XM16E1

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and the A-R bipod can neither be adjusted in height nor folded. The H-R type folds, but is not adjustable in height. However, due to its claw-like feet and the position at which it attaches to the rifle, the H-R type enables the firer to engage targets with less lateral movement than with the other candidate types.

## 2.14.4.2 (C) Carbines (U)

2.14.4.2.1 (C) The combination tool for the M14 is suitable. Since a cartridge can be used in lieu of a combination tool with the C-SMG and the S-C, the lack of a tool for those weapons is acceptable.

2.14.4.2.2 (C) The M14 type cleaning rod is suitable. No cleaning rod was furnished for the C-SMG or the S-C, but one is needed.

2.14.4.2.3 (C) Carrying slings were evaluated and reported on in Sub-Test No 13, Portability and Aerial Delivery. None was provided with the C-SMG or the S-C, but one is needed.

## 2.14.4.3 (C) Automatic Rifles (U)

2.14.4.3.1 (C) The combination tool for the M14E2 is suitable. Since a cartridge can be used in lieu of a combination tool with the C-AR and the S-AR, the lack of a combination tool for those weapons is acceptable.

2.14.4.3.2 (C) The M14E2 type cleaning rod is suitable. No cleaning rod was provided with the C-AR and S-AR, but one is needed.

2.14.4.3.3 (C) Carrying slings were evaluated and reported on in Sub-Test No 13, Portability and Aerial Delivery. None were provided with the C-AR nor the S-AR, but one is needed.

2.14.4.3.4 (C) The modified M2 bipod for the M14E2 is readily, but not quickly, attached and detached. The M3 bipod for the C-AR is readily attached and detached but is too easily detached when inadvertently struck. In addition, it is neither adjustable in height, nor does it fold. The S-AR bipod is easily attached and detached, is adjustable in height, but does not fold. It too has a tendency to become detached when inadvertently struck.

## 2.14.4.4 (C) Shortcomings of the Candidate Weapons (U)

### 2.14.4.4.1 (C) S-R:

Incomplete maintenance package (ref Sub-Test No 15, Maintenance).

### 2.14.4.4.2 (C) XM16E1 and A-R:

Bipod is not adjustable for height.

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2.14.4.4.3 (C) H-R:

- a. Incomplete maintenance package (no cleaning rod) (ref Sub-Test No 15, Maintenance).
- b. Bipod is not adjustable for height.
- c. Special tools required for rear sight adjustment and zeroing (ref Sub-Test No 4, Sights).

2.14.4.4.4 (C) S-C and C-SMG:

- a. Incomplete maintenance package (no cleaning rod) (ref Sub-Test No 15, Maintenance).
- b. No carrying sling provided.

2.14.4.4.5 (C) C-AR:

- a. Incomplete maintenance package (no cleaning rod) (ref Sub-Test No 15, Maintenance).
- b. No carrying sling provided.
- c. Bipod becomes detached too easily when inadvertently struck.
- d. Bipod is not adjustable for height.

2.14.4.4.6 (C) S-AR:

- a. Incomplete maintenance package (no cleaning rod) (ref Sub-Test No 15, Maintenance).
- b. No carrying sling.
- c. Bipod becomes detached too easily when inadvertently struck.

2.14.4.4.7 (C) Cleaning Rod (M11):

Lack of durability (ref Sub-Test No 15, Maintenance).

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## 2.15 (C) SUB-TEST NO 15, MAINTENANCE (U)

### 2.15.1 (C) OBJECTIVES (U)

#### 2.15.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

To evaluate (ref para 7, Part I, App III):

- a. Ease of assembly and disassembly and tools required.
- b. Ease of maintenance under combat conditions, to include cleaning and maintenance tools/equipment to be provided as basic issue items.
- c. Design which precludes reversed assembly to the detriment of its functioning (to include barrel change, if appropriate).
- d. Soldier-proof features of (ref para 6e, Part I, App III):
  - (1) Tamper-proof controls. (Controls which change mode of fire from semiautomatic to automatic)
  - (2) Reversed assembly.
- e. Assembly, disassembly, and maintenance techniques. (Ref para 8b, Part I, App III.)

#### 2.15.1.2 (C) Machine Guns (U)

##### Specific

To evaluate:

- a. Ease of assembly and disassembly and tools required. (Ref para 6, Part II, App III.)
- b. Ease of maintenance under combat conditions. (Ref para 6, Part II, App III.)
- c. Design which precludes reversed assembly to the detriment of its functioning. (Ref para 6, Part II, App III.)
- d. Soldier-proof features of (ref para 5e, Part II, App III):
  - (1) Tamper-proof controls.
  - (2) Reversed assembly.

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e. Assembly, disassembly, and maintenance techniques. (Ref para 7b, Part II, App III.)

## 2.15.2 (C) METHOD (U)

### 2.15.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.15.2.1.1 (C) Throughout all sub-tests, the candidate rifles were evaluated as to maintenance required. Special attention was given to the determination of the following:

a. Ease of field assembly and disassembly and tools required. (Special techniques developed were recorded.)

b. Ease of maintenance, to include cleaning and maintenance tools.

c. Any parts which could be reversed in assembly to the detriment of functioning.

d. Whether controls that are so designed are tamper proof.

2.15.2.1.2 (C) Throughout all maintenance periods, test personnel were instructed to report any part or assembly which they believed could be reversed in assembly, and to report any part, designed to be tamper proof, that could be tampered with.

2.15.2.1.3 (C) Throughout all testing, adequacy of the maintenance package furnished with each type candidate rifle was evaluated, and difficulties encountered were recorded. A determination as to the adequacy of the POMM was made.

### 2.15.2.2 (C) Machine Guns (U)

2.15.2.2.1 (C) Each of ten test soldiers disassembled (field stripped) and assembled each type of candidate machine gun, using the procedures prescribed in appropriate references, five times during daylight and five times during darkness. The average times under each light condition were computed and recorded. Each test soldier was questioned as to the comparative ease of disassembly and assembly and as to any difficulties encountered. Any tools required for disassembly and assembly were recorded.

2.15.2.2.2 (C) During the conduct of all sub-tests, the ease of maintenance under simulated combat conditions was noted, and particular attention was given to the following:

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- a. Whether any parts were capable of reversed assembly, to the detriment of functioning.
- b. Whether controls that were so designed were tamper-proof.
- c. Whether the maintenance kits provided were adequate..

2.15.2.2.3 (C) During the conduct of all tests, any special maintenance requirements which were peculiar to any of the candidate machine guns were recorded.

## 2.15.3 (C) RESULTS (U)

### 2.15.3.1 (C) Rifles (U)

2.15.3.1.1 (C) The candidate rifles were easy to disassemble and assemble for cleaning while in the field. A cartridge was used for disassembly of the S-R, XM16E1, and A-R rifles. The M14 required a combination tool for disassembly of the gas cylinder plug for cleaning. The H-R did not require a tool for disassembly. Average times for disassembly and assembly are indicated in Table 15-1 (fig 52 through 56, App V).

TABLE 15-1

DISASSEMBLY AND ASSEMBLY, RIFLES  
(Time in Seconds)

Weapon	Disassembly	Assembly
M14	19.5	39.5
S-R	13.6	28.6
XM16E1	14.0	18.0
H-R	15.0	34.5
A-R	13.5	30.0

2.15.3.1.2 (C) The carbon build-up in the S-R, XM16E1, H-R, and A-R was excessive in the operating groups and in the bore. The removal of this carbon was difficult and took an excessive amount of time. When questioned, the firers felt the M14 was easier to clean than the other candidate rifles. The S-R, XM16E1, H-R, and A-R required more lubrication to fire sustained exercises than the M14. The XM16E1 required more frequent cleaning than the other candidate rifles to keep it operational.

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2.15.3.1.3 (C) The following reversed assemblies of parts were reported by test personnel and test soldiers in the candidate rifles, resulting in improper functioning of the weapon:

- a. The gas piston in the M14.
- b. The tang on the carrier cap assembly in the S-R.
- c. The hammer spring in the S-R.

2.15.3.1.4 (C) The M14 was the only candidate rifle designed to have tamper-proof controls. The selector switch can be removed from the rifle, thus restricting the capability of the rifle to semiautomatic fire.

2.15.3.1.5 (C) The POMM or TM prescribed the following items for the candidate rifles. Those items actually received with the rifles are indicated by an "(X)" (fig 57, App V).

a. M14

Combination Tool (X)  
Brush, Cleaning, Small Arms, Bore (X)  
Brush, Cleaning, Small Arms, Chamber (X)  
Rod, Cleaning, Small Arms, M1 (X)

b. S-R

Combination Tool  
Brush, Cleaning, Receiver (X)  
Brush, Cleaning, Gas Cylinder (X)  
Brush, Cleaning, Utility  
Brush, Cleaning, Chamber (X)  
Brush, Cleaning, Locking Lug (X)  
Brush, Barrel, Bore  
Rod, Cleaning, M11

c. XM16E1

Brush, Cleaning, Bore  
Rod, Cleaning, M11 (X)

d. H-R

Bolt Space Dimension Tool (X) (Not required for every rifle)  
Sight Adjusting Tool (X)  
Phillips Screwdriver (X)  
Brush, Cleaning, Chamber (X)  
Rod, Cleaning, Chamber

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e. A-R

Rod, Cleaning, M11 (X)  
Brush, Cleaning, Bore

2.15.3.1.6 (C) The following items not listed in the TM or POMM were considered necessary and should have been included in the maintenance package:

a. M14

None

b. S-R

None

c. XM16E1

Brush, Cleaning, Chamber

d. H-R

Brush, Barrel, Bore  
Rod, Cleaning, M11

2.15.3.1.7 (C) The following paragraphs of the POMM prescribed as minimum by AR were omitted for the S-R: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

2.15.3.1.8 (C) The following paragraphs of the POMM prescribed as minimum by AR were omitted for the H-R: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Purpose, functioning, and relationship of the item.
- c. Photographs of the individual component parts by name.

2.15.3.1.9 (C) The following paragraphs of the POMM prescribed as minimum by AR were omitted for the A-R: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

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2.15.3.1.10 (C) The instructions and data for the M14 and XM16E1 are contained in their respective field manuals.

2.15.3.1.11 (C) The POMM for the H-R was not received with the rifle. It was provided after approximately 95 percent of the test was completed.

2.15.3.1.12 (C) The cleaning equipment of the M14 was carried in a compartment behind the butt plate in the stock. The cleaning equipment of the S-R, XM16E1, H-R, and A-R was carried in a carrying case, which also carried the quick detachable bipod of the rifle; however, the H-R carrying case did not provide a special compartment for the cleaning equipment as did the others.

2.15.3.1.13 (C) Cleaning rods (M11) were furnished with the XM16E1 and A-R. Cleaning rods were not furnished with the S-R and H-R; however, M11 cleaning rods were used with these weapons. These rods mushroomed and flared at the joints, and frequently broke at the joints.

## 2.15.3.2 (C) Carbines (U)

2.15.3.2.1 (C) Test soldiers were able to disassemble and assemble the candidate carbines without tools with no significant difficulty. A cartridge used as a tool is required for disassembly of the S-C and C-SMG. The M14 required a combination tool for disassembly of the gas cylinder plug (fig 52, 58, and 59, App V). The average times for disassembly and assembly are indicated in Table 15-2.

TABLE 15-2

### DISASSEMBLY AND ASSEMBLY, CARBINES (Time in Seconds)

Weapon	Disassembly	Assembly
M14	20.5	28.0
S-C	15.5	29.7
C-SMG	12.0	23.0

2.15.3.2.2 (C) No significant difficulties were encountered in cleaning all types of candidate carbines under simulated combat and field conditions.

2.15.3.2.3 (C) The following reversed assemblies of parts were reported by test personnel and test soldiers in the candidate carbines, resulting in improper functioning of the weapon:

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- a. The gas piston in the M14.
- b. The tang on the carrier cap assembly in the S-R.
- c. The hammer spring in the S-C.

2.15.3.2.4 (C) The M14 was the only candidate carbine designed to have tamper-proof controls. The selector switch can be removed from the rifle, thus restricting the capability of the rifle to semi-automatic fire.

2.15.3.2.5 (C) The M14 was able to fire a greater number of rounds than the S-C and the C-SMG before requiring cleaning and/or lubrication. The S-C and C-SMG tended to accumulate an excessive carbon build-up at a considerably greater rate than the M14, often causing stoppages to occur.

2.15.3.2.6 (C) Cleaning and lubrication requirements were more critical for the C-SMG than the S-C. The M14 cleaning and lubrication requirements were less critical than for the 5.56-mm candidate carbines.

2.15.3.2.7 (C) The POMM or TM prescribed the following maintenance items for the candidate carbines. Those items actually received with the weapons are indicated by an "(X)."

a. M14

Combination Tool (X)  
Brush, Cleaning, Small Arms, Bore (X)  
Brush, Cleaning, Small Arms, Chamber (X)  
Rod, Cleaning, Small Arms, M1 (X)

b. S-C

Combination Tool  
Brush, Cleaning, Receiver (X)  
Brush, Cleaning, Gas Cylinder (X)  
Brush, Cleaning, Utility  
Brush, Cleaning, Chamber (X)  
Brush, Cleaning, Locking Lug (X)  
Brush, Barrel, Bore  
Rod, Cleaning, M1

c. C-SMG

Rod, Cleaning, M1  
Brush, Cleaning, Bore

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2.15.3.2.8 (C) The following items not listed in the POMM were considered necessary and should have been included in the maintenance package:

a. M14

None

b. S-C

None

c. C-SMG

Brush, Cleaning, Chamber

2.15.3.2.9 (C) Cleaning rods for the M14 were acceptable with respect to durability under continued use. Cleaning rods were not furnished with the S-C and C-SMG. M14 cleaning rods were used with these weapons. These rods mushroomed and flared at the joints, and frequently broke at the joints.

2.15.3.2.10 (C) The following paragraphs of the POMM prescribed as minimum by AR were omitted for the S-C (R.F. 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

2.15.3.2.11 (C) The POMM for the C-SMG was identified by the manufacturer as a supplement to the technical manual for the XM16E1 (TM 9-1005-249-14). Only those aspects peculiar to the C-SMG were included in the POMM. All other information common to the XM16E1 and the C-SMG is referenced to TM 9-1005-249-14.

2.15.3.2.12 (C) The instructions and data for the M14 rifle are contained in FM 23-8.

2.15.3.2.13 (C) The cleaning equipment of the M14 was carried in a compartment behind the butt plate in the stock. There was no provision for carrying the cleaning equipment of the S-C and C-SMG either in the weapons or in carrying cases.

2.15.3.3 (C) Automatic Rifles (C)

2.15.3.3.1 (C) No tools were required for disassembly or assembly of the candidate automatic rifles; however, the combination tool for

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the M14E2 and the S-AR, and a 5.56-mm cartridge for the C-AR were helpful for disassembly. The combination tool was required for the M14E2 to detach and attach the M2 Bipod and the muzzle brake compensator. When questioned, the test soldiers stated that all the candidate automatic rifles were easy to disassemble and assemble (fig 60 through 62, App V).

2.15.3.3.2 (C) The average times for disassembly and assembly of the candidate automatic rifles are depicted in Table 15-3.

TABLE 15-3

## DISASSEMBLY AND ASSEMBLY, AUTOMATIC RIFLES (Time in Seconds)

Weapon	Disassembly	Assembly
M14E2	19.5	32.2
C-AR	6.8	9.8
S-AR	18.7	34.3

2.15.3.3.3 (C) The build-up of carbon was a common difficulty encountered with all three candidate automatic rifles. With the M14E2 the build-up of carbon around the muzzle brake compensator made it difficult to remove. In almost every instance it had to be removed by force, using a screwdriver, or some other such instrument, and a hammer. Soaking in solvent was not sufficient to loosen the carbon. With the C-AR and the S-AR the build-up of carbon was less of a problem and the parts remained easy to disassemble.

2.15.3.3.4 (C) The following reversed assemblies of parts were reported by test personnel and test soldiers in the candidate automatic rifles, resulting in improper functioning of the weapon:

- a. The gas piston in the M14E2.
- b. The tang on the carrier cap assembly in the S-AR.

2.15.3.3.5 (C) The M14E2 was the only candidate automatic rifle designed to have tamper-proof controls. The selector switch can be removed from the rifle, thus restricting the capability of the automatic rifle to semiautomatic fire.

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2.15.3.3.6 (C) The POMM or TM prescribed the following items for the candidate automatic rifles. Those items actually received with the automatic rifles are indicated by an "(X)" (fig 63, App V).

a. M14E2

Brush, Cleaning, Bore  
Brush, Cleaning, Chamber  
Rod, Cleaning, M11, and Case (X)  
Cleaning Rod Swab Holder Section (X)  
Combination Tool (X)  
Sling (X)

b. C-AR

Brush, Cleaning, Bore  
Rod, Cleaning, M11

c. S-AR

Brush, Cleaning, Bore  
Brush, Cleaning, Chamber (X)  
Brush, Cleaning, Locking Lug (X)  
Brush, Cleaning, Utility  
Brush, Cleaning, Gas Cylinder (X)  
Brush, Cleaning, Receiver (X)  
Rod, Cleaning, M11  
Combination Tool (X)

2.15.3.3.7 (C) The following items not listed in the POMM were considered necessary and should have been included in the maintenance package:

a. M14E2

None

b. C-AR

Brush, Cleaning, Chamber

c. S-AR

None

2.15.3.3.8 (C) Cleaning rods for the M14E2 were acceptable with respect to durability under continued use. Cleaning rods were not furnished with the C-AR and S-AR. M11 cleaning rods were used with these weapons. These rods mushroomed and flared at the joints, and frequently broke at the joints.

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2.15.3.3.9 (C) The following paragraphs of the POMM prescribed as a minimum by AR were omitted for the C-AR: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

2.15.3.3.10 (C) The following paragraphs of the POMM prescribed as a minimum by AR were omitted for the S-AR: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

## 2.15.3.4 (C) Machine Guns (U)

2.15.3.4.1 (C) No tools were required for disassembly or assembly of any of the candidate machine guns although a cartridge (or the combination tool) was helpful when disassembling the Code S machine guns (fig 64 and 65, App V).

2.15.3.4.2 (C) The average time for disassembly and assembly (fig 63 and 64, App V) of the candidate machine guns is listed in Table 15-4.

TABLE 15-4

### DISASSEMBLY AND ASSEMBLY, MACHINE GUNS (Time in Seconds)

Weapon	Day		Night	
	Disassembly	Assembly	Disassembly	Assembly
M60	25.4	68.1	31.8	117.1
Code S	36.9	66.6	33.4	109.0

2.15.3.4.3 (C) When questioned as to the ease of disassembly and assembly, 8 of 10 test soldiers indicated the Code S machine guns were easier to disassemble and assemble than the M60 machine guns.

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2.15.3.4.4 (C) The following reversed assemblies of parts were reported by test personnel and test soldiers in the candidate machine guns, resulting in improper functioning of the weapon:

- a. The gas piston in the M60 machine gun.
- b. The tang on the carrier cap assembly in the Code S machine gun.
- c. The trigger housing cover in the Code S machine gun.
- d. The feed cover latch in the Code S machine gun.

2.15.3.4.5 (C) The controls on the candidate machine guns were not designed to be tamper proof.

2.15.3.4.6 (C) The POMM or TM prescribed the following items for the candidate machine guns. Those items actually received with the machine guns are indicated by an "(X)": (Fig 63 and 66, App V).

a. M60

Brush, Cleaning, Small Arms; Bore (X)  
Brush, Cleaning, Small Arms; Chamber (X)  
Brush, Cleaning, Small Arms; Receiver (X)  
Case, Carrying: Barrel Assembly and Equipment (X)  
Extractor, Ruptured Cartridge Case (X)  
Magazine Assembly (X)  
Mitten, Cloth: Asbestos, M1942 (X)  
Rod, Cleaning, Small Arms: M1 (X)  
Sling, Small Arms: M1 (X)  
Wrench, Screwdriver, and Reamer Combination: (X)

b. Code S

Rod, Cleaning, M11  
Combination Tool (X)  
Brush, Barrel: Bore  
Brush, Cleaning: Gas Chamber (X)  
Brush, Cleaning: Chamber (X)  
Brush, Cleaning: Cylinder (X)  
Brush, Cleaning: Utility  
Brush, Cleaning: Receiver (X)  
Barrel Assembly: Spare (X)  
Bag, Canvas Carrying, Barrel (X)

2.15.3.4.7 (C) The following items not listed in the POMM were considered necessary and should have been included in the maintenance package:

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a. M60

None

b. Code S

Extractor, Ruptured Cartridge Case  
Sling, Web  
Mitten, Cloth: Asbestos, M1942

2.15.3.4.8 (C) The following paragraphs of the POMM prescribed as minimum by AR were omitted for the Code S machine guns: (Ref 38, App I.)

- a. Operation of materiel used in conjunction with major items.
- b. Operation under unusual conditions.
- c. Purpose, functioning, and relationship of the item.

2.15.3.4.9 (C) The gas rings on the barrel assembly of the Code S machine guns accumulated carbon during firing, and bore cleaner and a wire brush were needed to clean the gas rings. A drop of oil on the gas rings helped prevent carbon accumulation. During assembly, care had to be exercised to insure that the notches in each of the three gas rings were not aligned. Alignment of the three notches resulted in a poor gas seal. Neither the maintenance nor the alignment of the gas rings were covered in the POMM's.

2.15.3.4.10 (C) Early in the test program a representative of the manufacturer stated that the Code S machine guns should be heavily lubricated. This was in contradiction to the instructions in the POMM's, which stated that Code S machine guns should be oiled lightly. The weapons functioned better with liberal lubrication.

2.15.4 (C) ANALYSIS (U)

2.15.4.1 (C) Rifles (U)

2.15.4.1.1 (C) The ease of disassembly and assembly of the candidate rifles is suitable and the differences are not significant. Times for disassembly and assembly are acceptable. The use of a cartridge as a tool for the disassembly of the S-R, XM16E1, and A-R is not a shortcoming or a deficiency.

2.15.4.1.2 (C) The ease of maintenance of the candidate rifles under combat conditions is suitable. However, the excessive carbon build-up after firing the 5.56-mm candidate rifles is a significant

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disadvantage, since more frequent cleaning is required. The M14 is the easiest of the candidate rifles to clean.

2.15.4.1.3 (C) Those parts of the candidate rifles which can be reversed to the detriment of weapon functioning are:

- a. The gas piston of the M14.
- b. The tang on the carrier cap assembly of the S-R.
- c. The hammer spring of the S-R.

2.15.4.1.4 (C) The controls of the M14 are tamper proof. None of the other candidate rifles have controls designed to be tamper proof. This is not significant.

2.15.4.1.5 (C) The assembly, disassembly, and maintenance techniques of the candidate rifles are outlined by their respective TM or POMM. No special techniques are required.

2.15.4.1.6 (C) The maintenance package furnished with the candidate rifles, except the M14, is incomplete and inadequate.

2.15.4.1.7 (C) The omitted portion of the POMM's of the S-R, A-R, and H-R are essential for the preparation and training of the test soldiers with the candidate rifles.

2.15.4.1.8 (C) The M11 cleaning rods for use with the 5.56-mm weapons are unsuitable (para 2.15.3.1.13). This is significant.

2.15.4.1.9 (C) There is a need for a suitable chamber cleaning brush for the A-R and XM16E1. This is significant.

2.15.4.1.10 (C) The portability means provided for the cleaning equipment of the XM16E1, S-R, H-R, and A-R is adequate. This means is not considered as effective as that of the M14 because the cleaning equipment is not physically kept with the rifle; however, this is not significant.

2.15.4.2 (C) Carbines (U)

2.15.4.2.1 (C) The ease of disassembly and assembly of the candidate carbines is suitable, and the difference is not significant. Times for disassembly and assembly are acceptable. The use of a cartridge as a tool for the disassembly and assembly of the S-C and C-SMG is not a shortcoming or a deficiency.

2.15.4.2.2 (C) The ease of maintenance of the candidate carbines under combat conditions is suitable. The rapid carbon build-up

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after firing the 5.56-mm candidate carbine is regarded as a significant disadvantage in cleaning. The M14 is the easiest of the candidate carbines to clean.

2.15.4.2.3 (C) Those parts of the carbine candidates which can be reversed to the detriment of weapon functioning are:

- a. The gas piston of the M14.
- b. The tang on the carrier cap assembly of the S-C.
- c. The hammer spring of the S-C.

2.15.4.2.4 (C) The controls of the M14 are tamper proof. None of the other candidate carbines have controls designed to be tamper proof. This is significant.

2.15.4.2.5 (C) The assembly, disassembly, and maintenance techniques of the candidate carbines are outlined by their respective TM or POMM. No special techniques are required.

2.15.4.2.6 (C) The maintenance packages furnished with the candidate carbines, except the M14, are incomplete and inadequate.

2.15.4.2.7 (C) The omitted portions of the S-C POMM are considered essential for the preparation and training of test soldiers with these candidate carbines. The consolidation of the C-SMG POMM with the XM16E1 Technical Manual would be highly desirable, and would facilitate training. The POMM's for the S-C and C-SMG are incomplete.

2.15.4.2.8 (C) The means of carrying the cleaning equipment in the M14 is suitable. The lack of a means of carrying the cleaning equipment of the S-C and C-SMG is unacceptable.

2.15.4.3 (C) Automatic Rifles (U)

2.15.4.3.1 (C) With respect to ease of disassembly and assembly, the candidate automatic rifles are suitable. The C-AR is significantly easier to disassemble and assemble.

2.15.4.3.2 (C) The ease of maintenance of the candidate automatic rifles under combat conditions is suitable. However, the carbon build-up in the muzzle brake compensator of the M14E2 presents a significantly greater maintenance problem than with the other candidate automatic rifles. After the carbon build-up, the compensator is extremely difficult to remove, and special tools and a solvent are usually required. Therefore, under combat conditions the muzzle brake compensator could not be removed. This is significant.

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2.15.4.3.3 (C) Those parts of the candidate automatic rifles which can be reversed to the detriment of weapon functioning are:

- a. The gas piston of the M14E2.
- b. The tang on the carrier cap assembly of the S-AR.

2.15.4.3.4 (C) The controls of the M14E2 are tamper proof. None of the other candidate automatic rifles have controls designed to be tamper proof. This is not significant.

2.15.4.3.5 (C) The assembly, disassembly, and maintenance techniques of the candidate automatic rifles are outlined by their respective TM or POMM. No special techniques are required.

2.15.4.3.6 (C) The maintenance package of the M14E2 is inadequate. The maintenance packages of the C-AR and S-AR are inadequate.

2.15.4.3.7 (C) The POMM's of the C-AR and the S-AR are incomplete.

2.15.4.4 (C) Machine Guns (U)

2.15.4.4.1 (C) The ease of disassembly and assembly of the candidate machine guns is suitable and comparable.

2.15.4.4.2 (C) The ease of maintenance under combat conditions of the candidate machine guns is acceptable.

2.15.4.4.3 (C) Those parts of the candidate machine guns which can be reversed to the detriment of weapon functioning are:

- a. The gas piston of the M60.
- b. The tang on the carrier cap assembly of the Code S machine gun.
- c. The trigger housing cover of the Code S machine gun.
- d. The feed cover latch of the Code S machine gun.

2.15.4.4.4 (C) None of the candidate machine guns have controls designed to be tamper proof.

2.15.4.4.5 (C) The assembly, disassembly, and maintenance techniques of the candidate machine guns are outlined by their respective TM or POMM.

2.15.4.4.6 (C) The maintenance package provided with the Code S machine gun is inadequate.

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2.15.4.4.7 (C) The POMM for the Code S machine gun is incomplete.

2.15.4.5 (C) Deficiencies of the Candidate Weapons (U)

2.15.4.5.1 (C) S-R and S-C:

- a. The reversibility of the tang on the carrier cap assembly.
- b. The reversibility of the hammer spring.

2.15.4.5.2 (C) S-AR and Code S Machine Guns:

The reversibility of the tang on the carrier cap assembly.

2.15.4.6 (C) Shortcomings of the Candidate Weapons (U)

2.15.4.6.1 (C) M14:

Reversibility of the gas piston.

2.15.4.6.2 (C) S-R:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Too many brushes required for cleaning.

2.15.4.6.3 (C) XM16E1:

- a. Incomplete maintenance package.
- b. Lack of a chamber cleaning brush.

2.15.4.6.4 (C) H-R:

- a. Incomplete maintenance package.
- b. Incomplete POMM.

2.15.4.6.5 (C) A-R:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Lack of a chamber cleaning brush.

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## 2.15.4.6.6 (C) S-C:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Too many brushes required for cleaning.
- d. Lack of a means of carrying cleaning equipment.

## 2.15.4.6.7 (C) C-SMG:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Lack of a chamber cleaning brush.
- d. Lack of a means of carrying cleaning equipment.

## 2.15.4.6.8 (C) M14E2:

- a. Reversibility of the gas piston.
- b. Difficulty in removing the muzzle brake compensator.

## 2.15.4.6.9 (C) C-AR:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Lack of a chamber cleaning brush.

## 2.15.4.6.10 (C) S-AR:

- a. Incomplete maintenance package.
- b. Incomplete POMM.
- c. Too many brushes required for cleaning.

## 2.15.4.6.11 (C) M60:

- Reversibility of the gas piston.

## 2.15.4.6.12 (C) Code S Machine Guns:

- a. Incomplete maintenance package.

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- b. Incomplete POMM.
- c. Too many brushes required for cleaning.
- d. Reversibility of the trigger housing cover.
- e. Reversibility of the feed cover latch.

## 2.15.4.6.13 (C) Cleaning Rod (M11):

Lack of durability.

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## 2.16 (C) SUB-TEST NO 16, DURABILITY AND RELIABILITY (U)

### 2.16.1 (C) OBJECTIVE (U)

#### 2.16.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

##### To determine:

a. Ruggedness: Capability to withstand normal usage encountered in training and combat (ref para 5e, Part I, App IV).

b. Malfunctions (to include failures to feed or fire) in terms of number of rounds fired and categorized as: clearable by immediate action (Category I), and requiring parts replacement or correction by echelons higher than the individual using the weapon (Category II, III, or IV) (ref para 5d, App IV).

#### 2.16.1.2 (C) Machine Guns (U)

##### Specific

##### To determine:

a. Ruggedness: Capability to withstand normal usage encountered in training and combat (ref para 4e, Part II, App III).

b. Malfunctions (to include failure to feed or fire) in terms of number of rounds fired and categorized as: Clearable by immediate action (Category I), and requiring parts replacement or correction by echelons higher than the individual using the weapon (Category II, III, or IV). (Ref para 4d, Part II, App III.)

### 2.16.2 (C) METHOD (U)

#### 2.16.2.1 (C) Rifles, Carbines, Automatic Rifles, and Machine Guns (U)

2.16.2.1.1 (C) Throughout all testing, data bearing on durability and reliability of the candidate weapons were recorded. Special attention was given to their ruggedness.

2.16.2.1.2 (C) Throughout all sub-tests, malfunctions and part breakage which occurred with the candidate weapons were recorded. Malfunctions were categorized as follows:

a. Category I - Malfunctions which were corrected by immediate action on the part of the firer. The "immediate action" taken was appropriate to the type weapon and included such actions as manually operating the bolt or withdrawing a spent case with the fingers, but did not include field stripping and did not require the use of tools.

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b. Category II - Malfunctions which could not be corrected by Category I action, but were corrected in the field by field stripping and/or cleaning, lubricating, or minor adjustment without the use of tools (other than a cartridge or other aid normally available to the firer). This category did not include second echelon level work, but was intended to include actions which the soldier could take during a temporary respite in combat.

c. Category III - Malfunctions which could not be corrected by Category I or Category II action, but which were correctible at second echelon, using the tools, facilities, and skills normally available at that level.

d. Category IV - Malfunctions which could not be corrected by Category I, Category II, or Category III actions.

2.16.2.1.3 (C) Category I malfunctions were determined by the test NCO. The range officer determined Category II, III, and IV malfunctions.

2.16.2.1.4 (C) Malfunction abbreviations used will be as follows:

FF	- Failure to feed
FFR	- Failure to fire
FX	- Failure to extract
FJ	- Failure to eject
FBC	- Failure of bolt to close
SR <sup>1</sup>	- Short recoil
IFR	- Inadvertent firing
FMR	- Failure to maintain cyclic rate
BUB <sup>1</sup>	- Bolt underrode base of round in feeding
DF	- Double feed, two rounds fed from magazine at once
BCE <sup>1</sup>	- Bolt catch engaged bolt carrier instead of bolt after firing the last round in the magazine
BFE <sup>1</sup>	- Bolt failed to engage base of round in magazine
BLE <sup>1</sup>	- Bolt lacked sufficient energy to force round from magazine
BOB <sup>1</sup>	- Bolt overrode base of round in feeding from magazine
FBF	- Failure of bolt to go forward
FBR	- Failure of bolt to remain at rear after last round
FCB	- Fired on closure of bolt
FJC	- Failure to eject clip
FML <sup>2</sup>	- Failure of the magazine to lock in rifle
FTR	- Failure of trigger to return to forward position
F2R	- Fired 2 rounds on one rearward movement of trigger
BCS	- Bolt catch stopped forward movement of bolt before last round of magazine was fired

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FS - Failure to strip round  
FSO - Failure of bolt to sear off  
FFO<sup>1</sup> - Failure to feed round over to stripping position  
FBS - Failure of bolt to sear  
FRA - Failure to remain in assembly  
FL<sup>1</sup> - Failure to load by hand charging  
PS<sup>1</sup> - Partial strip of round from link

<sup>1</sup>Most frequent description of the cause of malfunction, rather than a malfunction itself. For example, a failure to feed due to the bolt overriding the base of a round in feeding from a magazine would be abbreviated as FF (BOB).

<sup>2</sup>Cause of FF on some occasions.

## 2.16.3 (C) RESULTS (U)

### 2.16.3.1 (C) Rifles (U)

2.16.3.1.1 (C) The total, and rate, of malfunctions by type, for each type candidate rifle, are listed in Table 16-1. The total, and rate, of malfunctions by type, for each candidate rifle are listed in Charts 16-1 through 16-5, Appendix II.

2.16.3.1.2 (C) The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each type candidate rifle are listed in Table 16-2. The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each candidate rifle are listed in Charts 16-6 and 16-7, Appendix II.

2.16.3.1.3 (C) A summary of broken, damaged, and lost parts for each type candidate rifle is listed in Charts 16-8 and 16-9, Appendix II. Chart 16-8 lists the broken, damaged, and lost parts to which malfunctions were attributed; Chart 16-9 lists the broken, damaged, and lost parts to which malfunctions were not attributed. (Figures 67 through 79, Appendix V.)

2.16.3.1.4 (C) The following modifications were made on the S-R's after they had been received for testing:

a. The gas port redrilled from .069 inches to .072 inches by the technical representative for the Code S weapons, after approval was obtained from USATECOM.

b. Forestock assembly was replaced by a modified assembly with a stop for the barrel latch pin, as directed by USATECOM. The lack of a stop for the barrel latch pin was considered a safety hazard by the Engineer Test Agency.

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TABLE 16-1

## TOTAL AND RATE OF MALFUNCTIONS--RIFLES AND CARBINES

WPN	TOTAL RDS FIRED		(1) FF	FFR	FX	FJ	FBC	FMR	BUB	DF
		(2) TOTAL	200	16	18	19	29	4		4
M14	518,380	(3) RATE	2592	32399	28799	27283	17875	129595		129595
		TOTAL	17	39	20	17	3	4		42
S-R	110,371	RATE	6492	2830	5519	6492	36790	27593		2628
		TOTAL	75	39	86	251	3	33		33
XM16E1	95,720	RATE	1276	2454	113	381	31907	22900		2900
		TOTAL	45	2	18					170
H-R	76,026	RATE	1689	38013	4224					447
		TOTAL	46	6	9	39	4			69
A-R	68,622	RATE	1492	11370	7625	1760	17155			995
		TOTAL	60	14	65	1			3	42
S-C	83,107	RATE	1385	5636	1278	83107			27702	1978
		TOTAL	29	4	43	2				11
C-SMG	81,871	RATE	3823	20467	1904	40935				7443

(Continued)

WPN		BOB	FBF	FBR	FTR	BCS	(4) TOTAL	(5) TOTAL MINUS (FBR)
	TOTAL	11	5	6		1	313	307
M14	RATE	47125	103676	86397		518380	1656	1689
	TOTAL	1		10		2	155	145
S-R	RATE	110371		11037		55186	712	761
	TOTAL	188		532		2	1242	710
XM16E1	RATE	509		180		47860	77	135
	TOTAL	1		7			243	236
H-R	RATE	76026		10861			313	322
	TOTAL	64		3			240	237
A-R	RATE	1072		22873			286	290
	TOTAL	42	2	5	1		231	226
S-C	RATE	1978	41553	16621	83107		354	368
	TOTAL	11	1	122			222	100
C-SMG	RATE	7443	81871	671			369	818

- LEGEND: (1) Abbreviations (ref para 2.16.2.1.4)  
 (2) Total of each type of malfunction for each type candidate weapon.  
 (3) Rate--Malfunction occurred: 1:rounds fired. (Example: M14, 200 Failures to Feed (FF), 1 FF occurred every 2,592 rounds fired.)  
 (4) Total malfunctions for each type candidate weapon.  
 (5) Total malfunctions minus the total FBR for each type candidate weapon (computed because of excessive XM16E1 and C-SMG FRR's).

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2.16.3.1.5 (C) The following modification was made on the H-R's after they had been received for testing:

The butt stock snap pin hole was increased in diameter and a bushing inserted by the technical representative for the H-R's after approval was obtained from USATECOM. This was done to overcome what was considered a safety hazard by the Engineer Test Agency.

2.16.3.1.6 (C) The following modifications were made on the A-R's after they had been received for testing:

a. The plunger take-down housing on the guide rod plate was cut off of the first seven rifles that were received by the technical representative for the A-R's after approval was obtained from USATECOM. This was done to overcome what was considered a safety hazard by the Engineer Test Agency.

b. The guide rod weld assembly was reinforced on the take-down plunger housing, and the guide rods were welded to the guide rod plate; originally they were threaded and screwed into the guide rod plate. This was accomplished by the technical representatives for the A-R's after approval was obtained from USATECOM to increase the durability of the guide rods and plunger take-down housing.

c. The groove on the lower receiver was increased to accept the modified guide rod weld assembly by the technical representative for the A-R's after approval was obtained from USATECOM.

2.16.3.1.7 (C) The following were significant with respect to the durability of the M14:

- a. Eight incidents of bolt rollers being cracked or broken.
- b. Two incidents of windage knob pinion assembly being stripped.
- c. Four incidents of the flash suppressor set screws coming loose and being lost.
- d. Six incidents of burned stocks.
- e. Four incidents of broken or cracked M2 bipods.

2.16.3.1.8 (C) The following were significant with respect to the durability of the S-R:

- a. Six incidents of bolts being cracked or broken (ref Fig 69, App V).

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b. Five incidents of bolt stops being broken.

c. Three incidents of the carrier and piston assembly being separated (ref Fig 70, App V).

d. One incident of the take-down pin being separated from the trigger housing group (ref Fig 71, App V).

2.16.3.1.9 (C) The following was significant with respect to the reliability of the S-R: One incident of selector switch being inoperative.

2.16.3.1.10 (C) The following were significant with respect to the durability of the XM16E1:

a. Four incidents of bolts being cracked or broken.

b. Four incidents where the bolt carrier keys had to be re-torqued.

c. Five incidents of the buffer assembly roll pins being separated or deformed.

d. Twenty-four incidents of the firing pin-retaining pin being cracked during firing.

2.16.3.1.11 (C) The following were significant with respect to the reliability of the XM16E1:

a. Five hundred thirty-two (532) incidents of the bolt failing to remain to the rear after the last round of a magazine had been fired. (Rate, 1:180 rounds fired.)

b. One hundred eighty-eight (188) incidents of the bolt over-riding the base of round in feeding from magazine. (Rate, 1:509 rounds fired.)

c. Two hundred fifty-one (251) incidents of failure to eject. (Rate, 1:381 rounds fired.)

d. One thousand two hundred forty-two (1,242) incidents of malfunctions. (Rate, 1:77 rounds fired.)

e. One incident of the selector switch being inoperative.

f. One incident of the front sight post being frozen.

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2.16.3.1.12 (C) The following were significant with respect to the durability of the H-R:

a. Five incidents of the bayonet adapter set screws being loose or lost with the bayonet adapter assembly separating from the operating tube.

b. Five incidents of the bolt stop spring being broken on the tip.

2.16.3.1.13 (C) The following are significant with respect to the reliability of the H-R:

a. Thirteen incidents of the operating rod pin coming loose and binding on the operating rod tube. Incidents recurred in rifles after initial malfunction was corrected.

b. Forty-four incidents of blown primers with M193 (WCC 6089) ammunition.

c. One hundred seventy (170) incidents of double feeds. (Rate, 1:447 rounds fired.)

d. Two hundred forty-three (243) incidents of malfunctions. (Rate, 1:313 rounds fired.)

2.16.3.1.14 (C) The following were significant with respect to the durability of the A-R:

a. Six incidents of the weld assembly guide rods being broken or separated from the guide rod plate (ref Fig 74, App V).

b. One incident of the upper receiver pivot being cracked (ref Fig 76, App V).

c. One incident of the bolt carrier assembly being burred enough to prevent removal of the firing pin. Others were burred to a lesser extent (ref Fig 77, App V).

d. One incident of the lower receiver being cracked on the magazine housing (ref Fig 76, App V).

e. Seven incidents of the lower receiver being cracked on the back plate weld (ref Fig 78, App V).

f. One incident of the barrel extension being cracked (ref Fig 76, App V).

g. Four incidents of the upper handguard liners being separated or loosened from the upper handguard.

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2.16.3.1.15 (C) The following were significant with respect to the reliability of the A-R:

a. Sixty-nine (69) incidents of double feeds. (Rate, 1:995 rounds fired.)

b. Sixty-four (64) incidents of the bolt overriding the base of round in feeding from magazine. (Rate, 1:1072 rounds fired.)

c. Two hundred forty (240) incidents of malfunctions. (Rate, 1:286 rounds fired.)

## 2.16.3.2 (C) Carbines (U)

2.16.3.2.1 (C) The total and rate of malfunctions by type for each type candidate carbine are listed in Table 16-1. The total and rate of malfunctions by type for each candidate carbine are listed in Charts 16-10 and 16-11, Appendix II.

2.16.3.2.2 (C) The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each type candidate carbine are listed in Table 16-2. The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each candidate carbine are listed in Chart 16-12, Appendix II.

2.16.3.2.3 (C) A summary of broken, damaged, and lost parts for each type candidate carbine is listed in Charts 16-13 and 16-14, Appendix II. Chart 13 lists the broken, damaged, and lost parts to which malfunctions were attributed; and Chart 14 lists the broken, damaged, and lost parts to which malfunctions were not attributed.

2.16.3.2.4 (C) The following modifications were made on the S-C's after they had been received for testing:

a. The gas port was redrilled to .707 inch by the technical representative for the Code-S Weapons after approval was obtained from USATECOM.

b. The forestock assembly was replaced with a modified assembly with a stop for the barrel latch pin as directed by USATECOM. The lack of a stop for the barrel latch pin was considered a safety hazard by the Engineer Test Agency.

2.16.3.2.5 (C) The following modification was made on C-SMG's after they had been received for testing: The muzzle brakes were replaced changing the outer-wall thickness from .062 inch to 0.125 inch by the technical representative for the Code-C Weapons after approval was obtained from USATECOM. The thinner outer-wall was considered a safety hazard by the Engineer Test Agency.

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TABLE 16-2  
TOTAL AND RATE OF MALFUNCTIONS, AND BROKEN, DAMAGED, AND LOST  
PARTS, BY CATEGORY -- RIFLES AND CARBINES

WEAPON	TOTAL ROUNDS FIRED		(1)		CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL (4)	
			CATEGORY I						
M14	518,380	(2) TOTAL	261		23	46	1	331	
		(3) RATE	1986		22538	11269	518380	1566	
		TOTAL	122		15	19	2	158	
		RATE	905		7358	5809	55186	699	
S-R	110,371	TOTAL	1140		74	55	5	1274	
		RATE	84		1294	1740	19144	75	
		TOTAL	151		79	23	2	255	
		RATE	503		962	3305	38013	298	
H-R	76,026	TOTAL	208		18	24	14	264	
		RATE	330		3812	2859	4902	260	
		TOTAL	167		39	22	3	231	
		RATE	498		2130	3778	27702	354	
A-R	68,622	TOTAL	202		14	4	2	222	
		RATE	405		5448	20468	40936	369	
		TOTAL							
		RATE							
S-C	83,107	TOTAL							
		RATE							
		TOTAL							
		RATE							
C-SMG	81,871	TOTAL							
		RATE							
		TOTAL							
		RATE							

- LEGEND: (1) Category defined (ref para 2.16.2.1.2)  
 (2) Total of each type of malfunction by category for each weapon candidate.  
 (3) Rate-Malfunction by category occurred 1: rounds fired. (Example: M14, 261  
 Category I malfunctions, 1 Category I malfunction occurred every 1986 rounds  
 fired.)  
 (4) Total malfunctions for each type candidate weapon.

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2.16.3.2.6 (C) The following were significant with respect to the durability of the S-C:

- a. Two incidents of bolts being cracked or broken
- b. Three incidents of bolt stops being broken.
- c. One incident of the carrier and piston assembly being separated.

2.16.3.2.7 (C) The following were significant with respect to the reliability of the S-C:

- a. One incident of the front sight post being frozen.
- b. Seven incidents of the gas port rings being frozen.
- c. Two hundred thirty-two (232) incidents of malfunctions.  
(Rate, 1:358 rounds fired.)

2.16.3.2.8 (C) The following were significant with respect to the durability of the C-SMG: Two incidents of bolts being cracked or broken.

2.16.3.2.9 (C) The following were significant with respect to the reliability of the C-SMG:

- a. One hundred twenty-two (122) incidents of the bolt failing to remain to the rear after the last round in the magazine had been fired. (Rate, 1:671 rounds fired.)
- b. Two hundred twenty-two (222) incidents of malfunctions.  
(Rate, 1:369 rounds fired.)

2.16.3.3 (C) Automatic Rifles (U)

2.16.3.3.1 (C) The total and rate of malfunctions by type for each candidate automatic rifle are listed in Table 16-3. The total and rate of malfunctions by type for each candidate automatic rifle are listed in Charts 16-15 through 16-17, Appendix II.

2.16.3.3.2 (C) The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each type candidate automatic rifle are listed in Table 16-4. The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each candidate automatic rifle are listed in Charts 16-18 through 16-20, Appendix II.

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TABLE 16-3  
TOTAL AND RATE OF MALFUNCTIONS  
AUTOMATIC RIFLES AND MACHINE GUNS

WPN	TOT RDS FIRED	FF(1)	FFR	FX	FJ	FBC	IFR	FMR	BUB
M14E2	TOTAL	( ) 19	12	21	7	9		1	
	RATE	(2) 5,647	8,940	5,109	15,327	11,921		107,287	
C-AR	TOTAL	19	5	128		3	1		
	RATE	4,489	17,060	666		28,433	85,299		
S-AR	TOTAL	48	13	83	17		65		1
	RATE	1,847	6,824	1,068	5,216		1,364		88,671
M60	TOTAL	15	3	11	3	1			
	RATE	12,118	60,589	16,524	60,589	181,768			
Code S	TOTAL	686	734	187	236	4		1	207
	RATE	250	234	917	726	42,858		171,433	828

(Continued on next page)

LEGEND: (1) Abbreviations (ref para 2.16.2.1.4)

(2) Total of each type of malfunction for each type candidate weapon

(3) Rate - Malfunction occurred 1: round fired (example: M14E2, 19 failures to feed (FF), 1,1FF occurred every 5,647 rounds fired)

(4) Total malfunctions for each type candidate weapon



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TABLE 16-3 (cont)  
TOTAL AND RATE OF MALFUNCTIONS  
AUTOMATIC RIFLES AND MACHINE GUNS

WPN	TOT RDS FIRED		DF	BFE	FML	LPS	SLWF	FBF	FBR	(4) TOTAL
M14E2	107,287	TOTAL	(2) 2		1	1	1			74
		RATE	(3) 53,644		107,287	107,287	107,287			1,450
C-AR	85,299	TOTAL	26	1	1	51				235
		RATE	3,281	85,299	85,299	1,672				363
S-AR	88,671	TOTAL	28			8				263
		RATE	3,167			11,084				337
M60	181,768	TOTAL						1		34
		RATE						181,768		5,346
Code S	171,433	TOTAL						2	1	2,058
		RATE						85,117	171,433	83

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TABLE 16-4  
TOTAL AND RATE OF MALFUNCTIONS AND BROKEN,  
DAMAGED, AND LOST PARTS, BY CATEGORY -  
AUTOMATIC RIFLES AND MACHINE GUNS

WPN	TOTAL ROUNDS FIRED	(1) CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	(4) TOTAL
M14E2	107,287	(2) 71	4	10	4	89
		(3) 1,511	26,822	10,729	26,822	1,205
C-AR	85,299	218	0	19	6	243
		391		4,489	14,217	351
S-AR	88,671	257	3	13	5	278
		345	29,557	6,821	17,734	319
M60	181,768	22	12	6	0	40
		8,262	15,147	30,295		4,544
Code S	172,433	1,638	399	24	12	83
		105	432	7,185	14,369	2,073

LEGEND: (1) Category defined (ref para 2.16.2.1.2)  
(2) Total of each type of malfunction by category for each type candidate weapon  
(3) Rate - Malfunction by category occurred 1: rounds fired (example: M14E2, 71 Category I malfunctions, 1 Category I malfunction occurred every 1511 rounds fired)  
(4) Total malfunctions by category for each type candidate weapon

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2.16.3.3.3 (C) A summary of broken, damaged, and lost parts for each type candidate automatic rifle is listed in Charts 16-21 through 16-26, Appendix II. The charts are separated into the broken, damaged, and lost parts to which malfunctions were attributed and the broken, damaged, and lost parts to which malfunctions were not attributed.

2.16.3.3.4 (C) No modifications were made to the M14E2 or the C-AR after they were received for testing. The gas ports of the S-AR's were redrilled from .055 - .057 inch to .059 inch by the technical representative for the Code-S Weapons after approval was obtained from USATECOM.

2.16.3.3.5 (C) The following were significant with respect to the durability of the M14E2:

- a. Three incidents of burned stocks.
- b. Three incidents of broken bipods (ref Fig 80, App V).

2.16.3.3.6 (C) The following were significant with respect to the durability of the C-AR:

- a. Five incidents of broken extractor springs.
- b. Nine incidents of broken action spring assembly (ref Fig 81, App V).
- c. One incident of a broken bolt (ref Fig 82, App V).

2.16.3.3.7 (C) The following were significant with respect to the reliability of the C-AR:

- a. One hundred twenty-seven (127) incidents of failure to extract. (Rate, 1:666 rounds fired.)
- b. Two hundred thirty-five (235) incidents of malfunctions. (Rate, 1:363 rounds fired.)

2.16.3.3.8 (C) The following were significant with respect to the durability of the S-AR:

- a. Six instances of lost or damaged housing sight assembly pin.
- b. One incident of the piston rod separating from the bolt carrier.

2.16.3.3.9 (C) The following were significant with respect to the reliability of the S-AR:

- a. Sixty-five incidents of inadvertent fire (run-away gun).

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b. Two hundred sixty-three (263) incidents of malfunctions.  
(Rate, 1:337 rounds fired.)

## 2.16.3.4 (C) Machine Guns (U)

2.16.3.4.1 (C) The total and rate of malfunctions by type for each type candidate machine gun are listed in Table 16-3. The total and rate of malfunctions by type for each candidate machine gun are listed in Charts 16-27 and 16-28, Appendix II.

2.16.3.4.2 (C) The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each type candidate machine gun are listed in Table 16-4. The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each candidate machine gun are listed in Charts 16-29 and 16-30, Appendix II.

2.16.3.4.3 (C) A summary of broken, damaged, and lost parts for each type candidate machine gun is listed in Charts 16-31 through 16-34, Appendix II.

2.16.3.4.4 (C) The numbers of rounds recorded for each of two barrels for each of the candidate machine guns are shown in Chart 16-35, Appendix II. These data were not collected during function firing so the total rounds listed for barrels do not equal the total rounds listed for weapons.

2.16.3.4.5 (C) Buffer assemblies, bolt plugs, drive spring guides, and operating rods of a newer design were placed in all the M60 machine guns at the request of USAWECOM. The replaced parts were not categorized as broken, damaged, or lost since they were still serviceable when replaced.

2.16.3.4.6 (C) Initial firing indicated that the Code-S machine guns were under-powered. Their gas ports were enlarged to .070 inch by the technical representatives for the Code-S Weapons after approval was obtained from USATECOM.

2.16.3.4.7 (C) The following were significant with respect to the durability of the M60 machine gun:

- a. Two gas cylinder plugs came out while firing.
- b. Two bolt plug lock pins were lost.
- c. Twenty-one adjustable range plates on the rear sight were bent during adjustment (ref Fig 84, App V).
- d. The right leg of two M122 tripod mounts bent while being put into action. An attempt to straighten one of the legs resulted in a cracked leg (ref Fig 85, App V).

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2.16.3.4.8 (C) The following were considered significant with respect to the durability of the Code-S machine guns:

- a. Two trigger pins vibrated loose during firing.
- b. Two feed cover assembly pins vibrated loose during firing.
- c. Five bolts were broken (ref Fig 88 and 89, App V).
- d. Two windage knobs were bent.
- e. Two feed cover latches fell apart.
- f. Two pistons separated from the carrier.
- g. One set of barrel bushing rings was broken.
- h. One set of carrier cap rollers disassembled (ref Fig 91, App V).
- i. One barrel had a hole blown in it.
- j. Nine cartridges ruptured, seven of these on one weapon.

2.16.3.4.9 (C) The following were considered significant with respect to the reliability of the Code-S machine guns:

- a. Six hundred eighty-six (686) incidents of failures to feed.  
(Rate, 1:250 rounds fired.)
- b. Seven hundred thirty-four (734) incidents of failures to fire.  
(Rate, 1:234 rounds fired.)
- c. One hundred eighty-seven (187) incidents of failures to extract.  
(Rate, 1:917 rounds fired.)
- d. Two hundred thirty-five (235) incidents of failures to eject.  
(Rate, 1:726 rounds fired.)
- e. Two hundred seven (207) incidents of cases of the bolt under-riding the base of the round (ref Fig 93, App V). (Rate, 1:828 rounds fired.)
- f. Two thousand fifty-eight (2,058) incidents of malfunctions.  
(Rate, 1:83 rounds fired.)

The term bolt underide (BUB) actually described failures to feed, but was used to describe those stoppages where the round was partially stripped and bent by the bolt in feeding. At least 10 percent of the failures to feed (FF) were caused by links preventing the bolt from going fully forward.

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2.16.3.4.10 (C) Toward the end of testing it was observed that 16 Code-S machine gun firing pins were becoming slightly burred (ref Fig 94, App V). However, no increase in malfunctions was noted. Since testing was nearly completed, the firing pins were not replaced.

2.16.3.4.11 (C) Toward the end of testing it was observed that the left guide rail of seven Code-S machine guns was bent slightly. These weapons were closely observed for the remainder of the test, but no effects could be attributed to the bent guide rails.

2.16.3.4.12 (C) One S-MMG was badly damaged upon impact with the ground while being jumped from an aircraft (ref para 2.13.3.4.5 and Fig 95 through 97, App V).

2.16.3.4.13 (C) S-LMG 000591 apparently misfired due to a light firing pin strike. This was followed by a cook-off with the bolt partially unlocked. Approximately 510-530 rounds had been fired in a period of 8-9 minutes. The cook-off occurred approximately 3-5 seconds after the failure to fire. The firer stated he had neither opened the feed cover nor retracted the cocking handle. The barrel was blown approximately 1 foot in front of the gun (ref Fig 98, App V) and the barrel locking pin was missing (ref Fig 99, App V). The bolt was to the rear, no round was in the chamber, there was unburned powder in the feed cover, and a ruptured cartridge (ref Fig 98, App V) was found beneath the gun. The bolt was cracked in several places (ref Fig 100, App V), a locking lug was sheared off the bolt (ref Fig 99 and 100, App V), and the receiver was bulged on the right side (ref Fig 99, App V). The extractor, extractor spring, and a piece of a roll pin were found in the vicinity of the gun.

## 2.16.4 (C) ANALYSIS (U)

### 2.16.4.1 (C) Rifles, Carbines, Automatic Rifles, and Machine Guns (U)

2.16.4.1.1 (C) All of the candidate rifles, carbines, and automatic rifles were rugged enough to withstand normal usage. However, it was the opinion of the test officer that the M14 was the most rugged overall of the candidate rifles and candidate carbines, and that the M14E2 was the most rugged overall of the candidate automatic rifles. The M60 was the most rugged overall of the candidate machine guns.

2.16.4.1.2 (C) Malfunctions in terms of rounds fired for candidate rifles, carbines, automatic rifles, and machine guns are categorized in Tables, 16-1, 16-2, 16-3, and 16-4.

2.16.4.1.3 (C) The M14 had a significantly lower and the XM16E1 had a significantly higher malfunction rate than the other candidate rifles and carbines.

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2.16.4.1.4 (C) The M14E2 had a significantly lower malfunction rate than the other candidate automatic rifles

2.16.4.1.5 (C) The M60 machine gun has a significantly lower malfunction rate than the Code-S machine gun.

2.16.4.2 (C) Deficiencies of the Candidate Weapons (U)

2.16.4.2.1 (C) Durability (U)

S-R:

- a. Excessive number of cracked bolts.
- b. Separation of the bolt carrier and piston assembly.

XM16E1:

- a. Excessive number of cracked bolts.
- b. Bolt carrier key became loose and required retorquing.
- c. Cracked firing pin retaining pins.

A-R:

- a. Broken guide rod weld assemblies.
- b. Cracked lower receivers.
- c. Burred bolt carrier.
- d. Cracked upper receiver pivot.
- e. Cracked barrel extension.

S-C:

- a. Cracked bolts.
- b. Separation of the bolt carrier and piston assembly.

C-SMG:

Cracked bolts.

C-AR:

Broken action spring guide assembly.

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S-AR:

- a. Separation of the bolt carrier and piston assembly.
- b. Unreliable after exposure to sand, mud, and water (previously reported in Sub-Test No 13).

Code-S Machine Gun:

- a. Broken bolts.
- b. Separation of the bolt carrier and piston assembly.
- c. Broken barrel bushing rings.
- d. Broken carrier cap rollers.
- e. Hole blown in barrel.

## 2.16.4.2.2 (C) Reliability (U)

H-R:

Binding of the operating rod pin on the operating tube.

Code S Machine Gun:

- a. Excessive failures to feed.
- b. Excessive failures to fire.
- c. Excessive failures to extract.
- d. Excessive failures to eject.
- e. Excessive bolt underrides.
- f. The explosion which occurred with weapon 000591.
- g. Tendency of the feed latch to fly apart and strike the firer in the face when the feed cover is opened.

## 2.16.4.3 (C) Shortcomings of the Candidate Weapons (U)

### 2.16.4.3.1 (C) Durability (U)

M14:

- a. Cracked bolt rollers.
- b. Stripped windage knob pinion assembly.

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c. Flash suppressor set screw loosens.

d. Cracked or broken jaw on M2 bipod.

e. Burned or cracked stocks.

S-R:

a. Cracked bolt stops.

b. Separation of the take-down pin from the trigger housing group.

XM16E1:

Separation and deformation of buffer assembly roll pins.

H-R:

a. Bayonet adapter set screws loosen.

b. Broken bolt stop springs.

A-R:

Separation of the upper handguard liner from the upper handguard.

S-C:

Cracked bolt stops.

M14E2:

a. Burned forestock caused by automatic fire.

b. Broken bipod jaws.

C-AR:

a. The frequency of broken extractor springs.

b. Broken bolt.

S-AR:

Damaged and lost housing, sight, assembly pins.

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M60:

- a. Lost gas cylinder plug.
- b. Lost bolt plug lock pins. (Corrected, see para 3, App IV).
- c. Bent rear sight adjustable range scale.
- d. Bent M122 tripod legs.

Code-S Machine Gun:

- a. Lost trigger pins.
- b. Lost feed cover assembly pins.
- c. Bent windage knobs.
- d. Ruptured cartridges.

## 2.16.4.3.2 (C) Reliability (U)

S-R:

Inoperative selector switch.

XM16E1:

- a. Excessive failures of the bolt to remain to the rear after the last round of a magazine had been fired.
- b. Excessive bolt overrides.
- c. Excessive failures to eject.
- d. Inoperative selector switch.
- e. Frozen front sight post.

H-R:

- a. Excessive blown primers.
- b. Excessive double feed.

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## A-R:

- a. Excessive double feed.
- b. Excessive bolt overrides.

## S-C:

- a. Frozen gas port rings.
- b. Frozen front sight post.

## C-SMG:

Excessive failure of bolt to remain to the rear.

## C-AR:

Excessive failures to extract.

## S-AR:

Excessive run-away guns.

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## 2.17 (C) SUB-TEST NO 17, VERSATILITY OF WEAPON DESIGN (U)

### 2.17.1 (C) OBJECTIVES (U)

#### 2.17.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### 2.17.1.1.1 (C) General (U)

To report, as appropriate, operational advantages provided by component interchangeability of candidate weapons (Reference 40, Appendix I).

##### 2.17.1.1.2 (C) Specific (U)

To determine versatility of weapon design in terms of modes of fire, and commonality of parts with other platoon weapons (ref para 6d, Part I, Appendix III).

#### 2.17.1.2 (C) Machine Guns (U)

##### 2.17.1.2.1 (C) General (U)

To determine, as appropriate, operational advantages provided by component interchangeability of candidate weapons (Reference 40, Appendix I).

##### 2.17.1.2.2 (C) Specific (U)

a. (C) To determine maximum commonality of parts, ammunition, and ammunition packaging with other weapons of the small arms family (ref para 2, Versatility, Part II, Appendix III).

b. (C) To evaluate versatility of weapon design in terms of use with bipod, tripod, vehicle and aircraft mounts, and commonality of parts with other platoon weapons (ref para 5d, Part II, Appendix III).

### 2.17.2 (C) METHOD (U)

#### 2.17.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.17.2.1.1 (C) Throughout all testing, suitability of interchange of assemblies, and parts common to two or more test weapons were reported. Readily exchanged assemblies and parts were identified and recorded. Operational advantages encountered were recorded.

2.17.2.1.2 (C) Throughout all testing, versatility of weapon design in terms of modes of fire and commonality of parts with other platoon weapons encountered was reported.

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## 2.17.2.2 (C) Machine Guns (U)

2.17.2.2.1 (C) Throughout all testing, suitability of interchange of assemblies and parts common to two or more test weapons were reported. Readily exchanged assemblies and parts were identified and recorded. Operational advantages encountered were evaluated.

2.17.2.2.2 (C) Throughout all testing, commonality of parts, ammunition, and ammunition packaging, with other weapons of the small arms family encountered, were reported.

2.17.2.2.3 (C) Throughout all testing, versatility of weapon design in terms of use with bipod and tripod encountered was evaluated. Vehicle and aircraft mounts were not used.

## 2.17.3 (C) RESULTS (U)

### 2.17.3.1 (C) Current Weapons Family (U)

2.17.3.1.1 (C) The current standard weapons family used in this test consisted of the M14 rifle, M14E2 rifle, and the M60 machine gun. The M14 and M14E2 contain interchangeable parts as indicated in Table 17-1. The M60 did not contain any parts or assemblies which could be interchanged with the M14 or M14E2.

2.17.3.1.2 (C) There was an operational advantage to be gained within the infantry rifle squad provided by the interchangeability and versatility of assemblies between the M14 and M14E2. No operational advantage occurred with the M60 machine gun.

2.17.3.1.3 (C) With respect to modes of fire, both the M14 and M14E2 delivered both semiautomatic and automatic fire, utilizing common interchangeable assemblies. The M60 delivered only automatic fire.

2.17.3.1.4 (C) With respect to weapon design in terms of use with bipod, tripod, and commonality of parts with other platoon weapons, the M60 could be used on either the bipod or tripod; however, the bipod and tripod could not be used with any other platoon weapon. No other type mounts were furnished for test.

2.17.3.1.5 (C) With respect to commonality of ammunition and ammunition packaging, the M14 and M14E2 7.62-mm ammunition, and its packaging, were interchangeable. The 5-round clip and charging device provided with 7.62-mm ammunition facilitated quick and easy changing of M14 and M14E2 magazines. Ammunition for the M60 machine gun could be used with the M14 and M14E2; however, the reverse was not possible without the ammunition links for the M60.

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TABLE 17-1

## INTERCHANGEABLE COMPONENTS OF CURRENT WEAPONS FAMILY

ASSEMBLIES	M14	M14E2	REMARKS
1. Stabilizer Assembly	X	X	Not normally used with M14.
2. Stock Group, M14	X	X	Not normally used with M14E2.
3. Stock Group, M14E2	X	X	Not normally used with M14.
4. Bipod, M2	X	X	Can be used on M14E2; however, no sling swivel is attached.
5. Bipod, M2 (Modified)	X	X	Not normally used with M14.
6. Sling, M14	X		The M14 sling was too short for the M14E2.
7. Sling, M14E2	X	X	Not normally used with M14.
8. M14 Butt Plate	X		
9. M14E2 Butt Plate		X	
10. Trigger Assembly	X	X	
11. Receiver w/all Component Parts	X	X	
12. Magazine	X	X	

### 2.17.3.2 (C) Code S Weapons Family (U)

2.17.3.2.1 (C) The Code S weapons family in this test consisted of the S-C, S-R, S-AR, S-LMG, and S-MMG. The S-LMG and S-MMG are considered to be one system, the Code S machine gun.

2.17.3.2.2 (C) There was an operational advantage gained within the infantry rifle platoon provided by the interchangeability of assemblies between the S-R, S-AR, and Code S machine gun. Although there is currently no requirement for a carbine in the infantry rifle platoon, the S-C contains interchangeable assemblies common to the other members of the Code S family. Those interchangeable parts and assemblies are listed in Table 17-2.

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TABLE 17-2

INTERCHANGEABLE COMPONENT ASSEMBLIES OF CODE S WEAPONS FAMILY

ASSEMBLIES	S-R	S-C	S-AR	S-LMG	S-MMG
1. Basic Component Group					
a. Stock Assembly	X	X	X	X	X
b. Trigger Housing Assembly	X	X	X	X	X
c. Receiver Group	X	X	X	X	X
2. Machine Gun Barrel Assembly				X	X
3. Rifle/Carbine/Barrel Assembly	X	X			
Automatic					
4. Rifle Barrel Assembly			X		
5. Butt Stock	X	X	X	X	
6. Bipod	X		X	X	
7. Cradle Adapter			X	X	X
8. MG Rear Sight				X	X
9. AR Rear Sight			X		
10. Rifle/Carbine Rear Sight	X	X			
11. MG Forestock and Forestock Assembly			X	X	
12. Magazine Adapter	X	X			
13. Magazine	X	X	X		
14. Belt Feed Group				X	X
15. Folding Butt Stock	X	X	X	X	

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2.17.3.2.3 (C) With respect to modes of fire and commonality of parts with other platoon weapons the S-C and S-R contain the capability to fire both semiautomatic and automatic fire, utilizing common parts and a common selector. The S-AR and Code S machine gun are capable of firing only automatic fire. However, many of the parts and assemblies were common to all members of the family.

2.17.3.2.4 (C) With respect to weapon design in terms of use with bipod, tripod, and commonality of parts with other platoon weapons, the Code S light machine gun bipod was identical to the S-R and S-AR bipod. No other type mounts were furnished for test.

2.17.3.2.5 (C) With respect to commonality of ammunition and ammunition packaging, the S-R, S-C, and S-AR 5.56-mm ammunition, and its packaging, were interchangeable. The 5.56-mm ammunition was provided in cartons and did not facilitate quick and easy charging of magazines. Ammunition for the Code S machine gun could be used with the S-R, S-C, and S-AR; however, the reverse was not possible without ammunition links for the Code S machine gun.

### 2.17.3.3 (C) Code C Weapons Family (U)

2.17.3.3.1 (C) The Code C weapons family in this test consisted of the XM16E1, C-SMG, and C-AR.

2.17.3.3.2 (C) There was an operational advantage gained within the infantry rifle squad provided through the interchangeability of parts between the XM16E1, C-SMG, and C-AR, although currently no requirement exists for a carbine or a submachine gun in the rifle squad. Those assemblies which are interchangeable within the Code C family are listed in Table 17-3.

2.17.3.3.3 (C) With respect to modes of fire and commonality of parts, all three members of the Code C family have the capability of delivering semiautomatic or full automatic fire, utilizing parts common to all members.

2.17.3.3.4 (C) With respect to commonality of ammunition and ammunition packaging, the XM16E1, C-SMG, and C-AR 5.56-mm ammunition, and its packaging, were interchangeable. The 5.56-mm ammunition was provided in cartons and did not facilitate quick and easy charging of magazines.

2.17.3.3.5 (C) The Code C family did not include a machine gun candidate.

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TABLE 17-3

## INTERCHANGEABLE COMPONENTS OF THE CODE C WEAPONS FAMILY

ASSEMBLIES	XM16E1	C-SMG	C-AR
1. Basic Component Group			
a. Trigger housing assembly	X	X	X
b. Receiver, complete upper		X	X
c. Receiver, complete lower	X		X
2. Stock, Rifle	X		X
3. Stock, Telescoping		X	
4. Magazines, 20 and 30 round	X	X	X
5. Handguard, Rifle	X		X
6. Handguard, C-SMG		X	
7. Buffer System, Rifle	X		
8. Buffer System, Automatic Rifle		X	
9. Buffer System, C-SMG			X
10. Barrel, Light	X		X
11. Barrel, Heavy	X		X
12. Barrel, Short		X	
13. Bipod, M2			X
14. Bipod, M3	X		X

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## 2.17.4 (C) ANALYSIS (U)

2.17.4.1 (C) It has been assumed that interchangeability of parts between different weapons in infantry squads and platoons does provide an operational advantage.

2.17.4.2 (C) The Code S family was the only candidate family that provided for versatility and component interchangeability in the rifle platoon, to include the rifle, automatic rifle, and machine gun. The other candidate families provided for component interchangeability within the rifle squad only, consisting of the rifle and the automatic rifle.

2.17.4.3 (C) Versatility of weapon design in terms of modes of fire, and commonality of parts with other platoon weapons was best provided by the Code S family.

2.17.4.4 (C) Maximum commonality was achieved with both the 5.56-mm and 7.62-mm ammunition. Ammunition packaging was best provided by the current standard 7.62-mm family.

2.17.4.5 (C) Versatility of weapon design in terms of use with bipod, tripod, and commonality of parts with other platoon weapons was best provided by the Code S family.

2.17.4.6 (C) The Code S family provided the greatest interchange of assemblies between weapons and may reduce training time in mechanical training.

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## 2.18 (C) SUB-TEST NO 18, SAFETY (U)

### 2.18.1 (C) OBJECTIVES (U)

#### Rifles, Carbines, Automatic Rifles, and Machine Guns

##### Specific

##### To evaluate:

a. Safety(s): Easily identifiable, conveniently located, positive safety(s) to prevent accidental firing and dangerous malfunctions, designed so that safe and fire positions can be determined by touch and operation of safety(s) is inaudible. (Ref para 3a(4), Part I, and para 1a(4), Part II, App III.)

b. Safety restrictions imposed on the employment of the weapon by such features as noise, blast, and discarding sabots. (Ref para 6c, Part I, and para 5c, Part II, App III.)

### 2.18.2 (C) METHOD (U)

#### 2.18.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.18.2.1.1 (C) During the conduct of Sub-Test No 1, Preoperational Inspection and Physical Characteristics, the safeties of all candidate rifles, carbines, and automatic rifles were examined. Any deficiencies noted were recorded, and corrected prior to firing tests. No firing was conducted until a safety release had been received.

2.18.2.1.2 (C) Throughout all sub-tests, particular attention was given to the external safety(s) on the candidate rifles, carbines, and automatic rifles to determine whether they were easily identifiable, conveniently located, and positive in action. Any accidental firing or dangerous malfunctions which occurred were recorded. If such malfunctions could be attributed to a defect in the safety, it was so noted. Safeties were examined to determine whether they were designed so that the safe and fire positions could be determined by touch and their operation was inaudible. Any safety restrictions or procedures not prescribed in the safety release or other publications for which a need was determined during testing were recorded.

2.18.2.1.3 (C) The safety release and manufacturers' manuals furnished with the test rifles, carbines, and automatic rifles were reviewed for safety restrictions and safety precautions to be observed during testing and such were adhered to throughout all testing. Any safety difficulties, particularly such features as noise, blast, and ammunition residue encountered during the test were recorded.

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## 2.18.2.2 (C) Machine Guns (U)

2.18.2.2.1 (C) During the conduct of Sub-Test No 1, Preoperational Inspection and Physical Characteristics, the safeties of all candidate machine guns were examined. Any deficiencies noted were recorded and corrected prior to firing tests. No firing was conducted until a safety release had been received.

2.18.2.2.2 (C) During the conduct of all sub-tests, any unsafe conditions or safety precautions imposed on the employment of weapons by such features as blast, noise, flash, and ammunition residue were noted. Specific attention was given to determining if the safeties were:

- a. Easily identifiable.
- b. Conveniently located.
- c. Identifiable by touch.
- d. Inaudible when operated.

2.18.2.2.3 (C) All safety restrictions or precautions noted in the safety release were observed. Any additional restrictions or precautions observed during testing were reported.

## 2.18.3 (C) RESULTS (U)

### 2.18.3.1 (C) Rifles (U)

2.18.3.1.1 (C) The safeties of the candidate rifles were found to be easily identifiable and conveniently located. The safeties of the M14 and H-R were positive in action and prevented accidental firing and dangerous malfunctions. The S-R would not fire with the safety selector switch between the safe position and the semiautomatic position; however, if the trigger was pulled with the safety selector switch between the safe position and the semiautomatic position, and the safety selector switch was then moved to the semiautomatic position, the S-R would sometimes fire without the trigger being pulled. Additionally, bumping or jarring the S-R after the trigger had been pulled, with the safety selector switch between the safe position and the semiautomatic position, would sometimes cause the S-R to fire. The XM16E1 and A-R would fire with the safety selector switch between the safe position and the fire position. In addition, the location of the alternate safety selector switch on the A-R (which must be used when the stock is folded) was confusing to a firer inexperienced with the A-R. The S-R, XM16E1, A-R, and H-R would fire with the safety selector switch between the semiautomatic position and the full automatic position; however, this was not a hazard.

2.18.3.1.2 (C) The safe and fire positions of the candidate rifles were found to be identifiable by touch; however, with the S-R, XM16E1, A-R (both safety selector switches), and H-R, because the safety was also the selector

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switch, it was sometimes difficult during the hours of darkness to ascertain whether the safety selector switch was in the safe position or on one of the fire positions. When questioned, the firers stated that the safe and fire position of the M14 safety were easier to identify by touch than those of the other candidate rifles.

2.18.3.1.3 (C) The operation of the safety on the M14 was significantly louder than the operation of the safeties of all other candidate rifles. The operation of the XM16E1 and A-R safeties was less audible than the operation of S-C and H-R safeties. The operation of the H-R safety was the least audible of all the candidate rifle safeties. With care, it was possible to manipulate the S-R, XM16E1, A-R, and H-R safeties in an inaudible manner.

2.18.3.1.4 (C) The alternate safety selector switch on the A-R did not have a position indicator to show whether it was in the safe position or on one of the fire positions (ref fig 78, App V).

2.18.3.1.5 (C) All firers were required to wear ear plugs and safety glasses during firing exercises. (Ref 20, App I.)

2.18.3.1.6 (C) Ammunition containing a sabot was not fired during this test.

2.18.3.1.7 (C) Safety restrictions and precautions for the candidate rifles are included in References 14, 15, and 20 through 27, Appendix I. Firing restrictions with respect to the number of rounds fired per unit of time without cooling were as follows:

a. S-R	Semiautomatic	150 rounds/51 seconds
	Automatic	150 rounds/35 seconds
b. A-R	Semiautomatic	140 rounds/69 seconds
	Automatic	140 rounds/35 seconds
c. H-R	Semiautomatic	100 rounds/34 seconds
	Automatic	100 rounds/24 seconds

The safety restrictions imposed with the S-R, A-R, and H-R in this test, with respect to the maximum number of rounds which could be fired before cooling, were so restrictive as to prohibit the completion of some firing exercises with one single rifle.

2.18.3.1.8 (C) The POMM's furnished by the manufacturers for the candidate rifles were reviewed and did not contain any unacceptable safety restrictions. However, the H-R POMM requires that the bolt space dimension be checked weekly with a bolt space dimension tool or standard feeler gauge. This could present a problem to the firer in the field.

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## 2.18.3.2 (C) Carbines (U)

2.18.3.2.1 (C) The safeties of the candidate carbines were found to be easily identifiable and conveniently located. The safety of the M14 was positive in action and prevented accidental firing and dangerous malfunctions. The S-C would not fire with the safety selector switch between the safe position and the semiautomatic position; however, if the trigger was pulled with the safety selector switch between the safe position and the semiautomatic position and the safety selector switch was then moved to the semiautomatic position, the S-C would sometimes fire without the trigger being pulled. Additionally, bumping or jarring the S-C after the trigger had been pulled with the safety selector switch between the safe position and the semiautomatic position would sometimes cause the S-C to fire. The C-SMG would fire with the safety selector switch between the safe position and the semiautomatic position. The S-C and C-SMG would fire with the safety selector switch between the semiautomatic position and the full automatic position; however, this was not a hazard.

2.18.3.2.2 (C) The safe and fire positions of the candidate carbines were found to be identifiable by touch; however, with the S-C and C-SMG, because the safety was also the selector switch, it was sometimes difficult during the hours of darkness to ascertain whether the safety selector switch was in the safe position or on one of the fire positions.

2.18.3.2.3 (C) The operation of the M14 safety was significantly louder than the operation of the S-C and C-SMG safeties. The operation of the S-C safety was less audible than the operation of the C-SMG safety. With care, it was possible to manipulate the S-C and C-SMG safeties in an inaudible manner.

2.18.3.2.4 (C) The S-C ejection pattern was larger than that of the other candidate carbines, and required that firers be spaced at least 5 meters apart to preclude discomfort or injury from ejected cartridge cases striking exposed skin of adjacent firers.

2.18.3.2.5 All firers were required to wear ear plugs and safety glasses during firing exercises (Ref 20, App I).

2.18.3.2.6 (C) Ammunition containing a sabot was not fired during this test.

2.18.3.2.7 (C) Safety restrictions and precautions for the candidate carbines are included in References 14, 15, and 20 through 27, Appendix I. Firing restrictions with respect to the number of rounds fired before cooling were as follows:

a. S-C	Semiautomatic	150 rounds/51 seconds
	Automatic	150 rounds/35 seconds
b. C-SMG	Semiautomatic	120 rounds/43 seconds
	Automatic	120 rounds/22 seconds

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The safety restrictions imposed with the S-C's and C-SMG's in this test, with respect to the maximum number of rounds which could be fired before cooling, were so restrictive as to prohibit the completion of some firing exercises with one single carbine.

2.18.3.2.8 (C) The POMM's furnished by the manufacturers for the candidate carbines did not contain any unacceptable safety restrictions.

## 2.18.3.3 (C) Automatic Rifles (U)

2.18.3.3.1 (C) The safeties of the candidate automatic rifles were found to be easily identifiable and conveniently located. The safety of the M14E2 was positive in action and prevented accidental firing and dangerous malfunctions. The C-AR and S-AR would fire with the safety selector switch between the safe position and the semiautomatic position. (The S-AR fires in the full automatic mode with the safety selector switch in this position.) Additionally, when an automatic rifleman (armed with the S-AR, the bolt closed and loaded with a magazine charged with dummy cartridges) "hit the ground," the impact was sometimes sufficient to cause the bolt to travel to the rear and pick up and chamber a cartridge, irrespective of the position of the safety selector switch. It was believed that this would have caused an inadvertent firing of the S-AR if live cartridges had been used. The C-AR and S-AR would fire with the safety selector switch between the semiautomatic position and the full automatic position (the S-AR fires in the full automatic mode with the safety selector switch in this position); however, this was not a hazard.

2.18.3.3.2 (C) The safe and fire positions of the candidate automatic rifles were found to be identifiable by touch; however, with the C-AR and S-AR, because the safety was also the selector switch, it was sometimes difficult during the hours of darkness to ascertain whether the safety selector switch was in the safe position or on one of the fire positions.

2.18.3.3.3 (C) The operation of the M14E2 safety was significantly louder than the operation of the C-AR and S-AR safeties. The operation of the S-AR safety was less audible than the operation of the C-AR safety. With care, it was possible to manipulate the C-AR and S-AR safeties in an inaudible manner.

2.18.3.3.4 (C) The following number of accidental firings occurred during the course of testing:

- a. M14E2 - None.
- b. C-AR - One cook-off.
- c. S-AR - Sixty-five occurrences of runaway gun.

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2.18.3.3.5 (C) All firers were required to wear ear plugs and safety glasses during firing exercises (Reference 20, Appendix I).

2.18.3.3.6 (C) Ammunition containing a sabot was not fired during this test.

2.18.3.3.7 (C) Safety restrictions and precautions for the candidate automatic rifles are included in References 14, 15, and 20 through 27, Appendix I. Firing restrictions with respect to the number of rounds fired before cooling were as follows:

a. S-AR	Semiautomatic	210 rounds/66 seconds*
	Automatic	210 rounds/36 seconds

\*Fired in 3- to 5-round bursts.

b. C-AR	Semiautomatic	150 rounds/67 seconds
	Automatic	180 rounds/56 seconds

The safety restrictions imposed with the S-AR and C-AR in this test with respect to the maximum number of rounds which could be fired before cooling, were so restrictive as to prohibit the completion of some firing exercises with one single automatic rifle.

2.18.3.3.8 (C) The POMM's furnished by the manufacturers for the candidate automatic rifles did not contain any unacceptable safety restrictions.

## 2.18.3.4 (C) Machine Guns (U)

2.18.3.4.1 (C) The safeties of the candidate machine guns were found to be easily identifiable and conveniently located. Neither the M60 machine gun nor the Code S machine gun had a positive safety because the safety mechanism of each secured only the sear, and did not prevent the bolt from traveling freely between its forward locked position, and a position forward of the sear but to the rear of the feed tray from where a new cartridge could be picked up, chambered, and fired. In addition, the Code S machine gun would fire with the safety selector switch between the safe position and the semiautomatic position (the Code S machine gun fires in the full automatic mode with the safety selector switch in this position). The Code S machine gun would fire in the full automatic mode with the safety selector switch between the semi-automatic position and the full automatic position; however, this was not a hazard.

2.18.3.4.2 (C) The safe and fire positions of the candidate machine guns were found to be identifiable by touch.

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2.18.3.4.3 (C) The operation of the candidate machine gun safeties was audible; however, with care, it was possible to manipulate them in an inaudible manner.

2.18.3.4.4 (C) When fired, the Code S machine guns emitted gas and particles from the openings in the receiver. Test soldiers commented that this sometimes adversely affected their ability to fire. The gas and particles emitted from the feed port made it dangerous for test soldiers acting as assistant gunners to get close enough to the left side of the Code S machine guns to effectively assist in loading and feeding ammunition.

2.18.3.4.5 (C) Numerous instances were observed in which the feed cover latch of the Code S machine guns flew apart from the feed cover when the feed cover was opened. A motion forward and to the right on the feed cover latch handle disassembled the feed cover latch. On three occasions test soldiers were struck in the face by the feed cover latch while attempting to open the feed cover while in the prone position.

2.18.3.4.6 (C) One S-LMG apparently misfired due to a light firing pin strike. This was followed by a cook-off with the bolt partially unlocked. The explosion extensively damaged the weapon (Sub-Test No 16, Durability and Reliability), blew a piece of brass into the firer's forearm, and powder burned the left hand of the firer. The cook-off level of the Code S machine guns was subsequently set at 200 rounds and was later reduced to 150 rounds (Reference 25, Appendix I). These cook-off levels were dependent upon the size of the burst and actual firing time.

2.18.3.4.7 (C) Test soldiers were required to wear ear plugs and safety glasses when firing the candidate machine guns (References 14 and 23, Appendix I).

2.18.3.4.8 (C) Ammunition containing a sabot was not fired during this test.

2.18.3.4.9 (C) Safety restrictions and precautions for the candidate machine guns are included in References 21, 23, 24, and 25, Appendix I. The firing restriction with respect to the number of rounds fired before cooling was: Code S machine gun--150 rounds. The safety restrictions imposed with the Code S machine gun in this test, with respect to the maximum number of rounds which could be fired before cooling, were so restrictive as to necessitate the use of six barrels to complete one firing exercise with one machine gun.

2.18.3.4.10 (C) The POMM furnished by the manufacturers for the Code S machine gun did not contain any unacceptable safety restrictions.

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## 2.18.4 (C) ANALYSIS (U)

### 2.18.4.1 (C) Rifles, Carbines, Automatic Rifles, and Machine Guns (U)

2.18.4.1.1 (C) The safety selector switches of all the candidate rifles, carbines, automatic rifles, and machine guns are easily identifiable and conveniently located.

2.18.4.1.2 (C) The safety selector switches of the M14 and the M14E2 are positive in action. The XM16E1, A-R, C-SMG, C-AR, S-AR, and Code S machine gun will fire with the safety selector switch between the safe position and the semiautomatic position. This is dangerous. The safeties of the S-AR and the candidate machine guns secure the sear but not the bolt, and, in this respect, are not positive. This is dangerous with respect to the S-AR, but not with respect to the candidate machine guns. All of the candidate rifles, carbines, automatic rifles, and machine guns, with the exception of the M14, M14E2, and M60 machine gun, will fire with the safety selector switch between the semiautomatic position and the full automatic position.

2.18.4.1.3 (C) The safety selector switches of all the candidate rifles, carbines, and automatic rifles, with the exception of the alternate safety selector switch of the A-R, are designed so that the safe and fire positions can be determined by touch; however, because the safeties of the XM16E1, S-R, A-R, H-R, S-C, C-SMG, C-AR, and S-AR were also selector switches, recognition of the safe position during the hours of darkness depends upon the familiarity of the firer with each type of weapon. It is confusing to have a safety switch and selector combined in one switch mechanism.

2.18.4.1.4 (C) None of the safety selector switches of the candidate rifles, carbines, automatic rifles, and machine guns were inaudible, and were audible to varying degrees when manipulated. The safety selector switches of all the candidate rifles, carbines, automatic rifles, and machine guns, with the exception of the M14 and M14E2, could, with care, be manipulated inaudibly.

2.18.4.1.5 (C) Safety restrictions requiring the use of ear plugs, because of noise and blast, are unacceptable in combat; the need for this safety restriction was not evaluated by this Board. None of the candidate rifles, carbines, automatic rifles, and machine guns fire ammunition using the discarding sabot principle.

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2.18.4.1.6 (C) The other safety restrictions imposed by the appropriate safety releases on the employment of all the candidate rifles, carbines, automatic rifles, and machine guns, with the exception of the M14, XM16E1, M14E2, and M60 machine gun, were unacceptable for the employment and use of the weapons by the infantryman.

2.18.4.1.7 (C) The number of runaway guns experienced while firing the S-AR is excessive.

2.18.4.1.8 (C) The gas and particles emitted by the Code S machine gun are a safety hazard.

2.18.4.1.9 (C) The low cook-off level of the Code S machine gun is a safety hazard.

2.18.4.1.10 (C) The tendency of the feed cover latch of the Code S machine gun to fly apart when the feed cover is opened is a safety hazard.

2.18.4.2 (C) Deficiencies of the Candidate Weapons are: (U)

2.18.4.2.1 (C) S-R, H-R, A-R, S-C, C-SMG, C-AR:

The safety restrictions imposed upon the weapons by the safety releases with respect to the maximum number of rounds which can be fired before cooling or changing barrels, make them unacceptable for infantry use.

2.18.4.2.2 (C) S-AR:

a. The safety restrictions imposed upon the weapons by the safety releases with respect to the maximum number of rounds which can be fired before cooling or changing barrels, make them unacceptable for infantry use.

b. A round could be inadvertently fired when "hitting the ground" with the butt.

2.18.4.2.3 (C) Code S Machine Gun:

a. The safety restrictions imposed upon the weapons by the safety releases with respect to the maximum number of rounds which can be fired before cooling or changing barrels, make them unacceptable for infantry use.

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b. The tendency of the feed latch to fly apart and strike the firer in the face when the feed cover is opened.

c. Explosive occurred when belt not fully closed and locked in barrel extension, seriously damaging weapon.

d. The gas and particles emitted from the machine gun while firing (ref Sub-Test No 19, Human Factors Engineering).

## 2.18.4.3 (C) Shortcomings of the Candidate Weapons are: (U)

### 2.18.4.3.1 (C) M14, M14E2:

High noise level of the safety.

### 2.18.4.3.2 (C) S-R and S-C:

a. The weapon will fire when the safety selector switch is between the safe position and the semiautomatic position.

b. The weapon will fire inadvertently when the selector switch is moved to the semiautomatic position after having pulled the trigger with the selector switch positioned between the safe and semiautomatic positions.

### 2.18.4.3.3 (C) XM16E1, C-SMG, C-AR, and Code S Machine Gun:

The weapons will fire when the safety selector switch is between the safe position and the semiautomatic positions.

### 2.18.4.3.4 (C) A-R:

a. The weapon will fire when the safety selector switch is between the safe position and the semiautomatic position.

b. The alternate safety selector switch has no indicator.

### 2.18.4.3.5 (C) S-AR:

a. The weapon will fire when the safety selector switch is between the safe position and the semiautomatic position.

b. Excessive number of runaway guns.

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## 2.19 (C) SUB-TEST NO 19, HUMAN FACTORS ENGINEERING (U)

### 2.19.1 (C) OBJECTIVES (U)

#### 2.19.1.1 (C) Rifles, Carbines, and Automatic Rifles (U)

##### Specific

##### 2.19.1.1.1 (C) To determine (ref para 3b, Part I, App III):

a. Size and Shape: Capability of being fired from either the right or left shoulder in all normal firing positions; capability of fire while wearing complete arctic clothing and gloves and CB protective mask and clothing.

b. Blast and Noise: Undue discomfort to the firer.

c. Ejection Pattern: Interference with adjacent firers or the firer's ability to aim and fire accurately from any position.

d. Heat: Effect on firer caused by heat transfer from the point-fire portion of the weapon and weapon heat absorption from exposure to the sun.

##### 2.19.1.1.2 (C) To evaluate:

a. Safety(s), Controls, Sights: Minimum number and designed so that they are easily located and identified by touch and operated with minimum of motion by the firer (in all firing positions) to include while wearing complete arctic clothing and gloves and CB protective clothing (ref 3b, Part I, App III).

b. Recoil: Minimum to permit shoulder and hip firing without undue discomfort to the firer. (Ref para 3b, Part I, App III.)

c. Pointing Characteristics: Configuration, sight design, and balance of the weapon as they affect pointing characteristics (ref para 3b(7), Part I, App III).

d. Length: Minimum permitted by other required characteristics, but not so short as to prohibit three-point support (chest and elbows) when firer is in the prone position (ref para 3a(3), Part I, App III).

#### 2.19.1.2 (C) Machine Guns (U)

##### Specific

##### 2.19.1.2.1 (C) To determine:

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a. Size and Shape: Capability of being fired from the bipod (from the left or right shoulder) and sustained fire mount; capability to fire while wearing complete arctic clothing and gloves and CB protective clothing (ref para 1b(1), Part II, App III).

b. Blast and Noise: Undue discomfort to the firer/crew (ref para 1b(4), Part II, App III).

c. Ejection Pattern: Interference with adjacent firers or the firer's ability to aim and fire accurately from any position (ref para 1b(5), Part II, App III).

d. Heat: Effects on firer caused by rapid or sustained fire and exposure to the sun (ref para 1b(8), Part II, App III).

## 2.19.1.2.2 (C) To evaluate:

a. Safeties, Controls, Sights: Minimum number and designed so that they are easily located and identified by touch and operated with a minimum of motion by the firer (in all firing positions) to include under extremes of weather and wearing complete arctic clothing and gloves and CB protective clothing (ref para 1b(2), Part II, App III).

b. Recoil: Minimum to permit shoulder, underarm, or hip firing without undue discomfort to the firer (ref para 1b(3), Part II, App III).

c. Pointing Characteristics: Configuration, sight design, and balance of the weapon as they affect pointing characteristics (ref para 1b(7), Part II, App III).

## 2.19.2 (C) METHOD (U)

### 2.19.2.1 (C) Rifles, Carbines, and Automatic Rifles (U)

2.19.2.1.1 (C) Test soldiers selected for participation in this test included both right and left-handed firers. Suitability for firing from either the right or left shoulder was determined for all candidate weapons.

2.19.2.1.2 (C) Throughout all tests, the candidate weapons were evaluated as to the following:

a. Size and Shape.

b. Minimum number of safeties, controls, and sights easily located, identified by touch, and operated with minimum of motion by the firer in all firing positions, to include while wearing arctic clothing, gloves, the protective mask, and CB protective clothing.

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- c. Blast and noise effects on the firer.
- d. Ejection pattern (interference with firer and adjacent firers.)
- e. Balance as it affects pointing characteristics.
- f. Heat transfer from the rifle and rifle heat absorption from the sun as they affect the firer.
- g. Whether three-point support (chest and elbows) can be achieved by all firers in the prone position.
- h. Effect of recoil on the firer.

## 2.19.2.2 (C) Machine Guns (U)

Throughout all tests, data reflecting on human factors engineering of the candidate machine guns were compiled. All test soldiers were instructed to report any difficulties experienced in aiming, firing, or maintaining the candidate weapons. Particular note was made of and the candidate machine guns were evaluated with respect to:

- a. The ability of the test soldiers to fire the candidate machine guns in all positions (right or left handed) while wearing temperate field clothing, arctic clothing, and gloves, and CB protective clothing.
- b. Any undue firer discomfort due to blast and noise.
- c. Interference with firer and adjacent personnel from the ejection pattern.
- d. Any effects on the firer caused by weapon heat from rapid or sustained fire, or heat from the sun.
- e. Location, ease of identification, and operation of all safeties, controls, and sights.
- f. Any undue firer discomfort due to recoil.
- g. Configuration, sight design, and balance of the weapon as they affect pointing characteristics were not evaluated.

## 2.19.3 (C) RESULTS (U)

### 2.19.3.1 (C) Rifles (U)

2.19.3.1.1 (C) The candidate rifles were fired from the right and left shoulder in all normal firing positions without difficulty by test soldiers wearing temperate clothing and equipment. The M14, A-R,

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and H-R could not be fired with arctic mittens. There is a winter trigger kit for the M14 (though not furnished for this test) that enables a firer to fire that rifle when wearing arctic mittens. The S-R trigger guard was removable, and the XM16E1 trigger guard would fold to permit these weapons to be fired while wearing arctic mittens.

2.19.3.1.2 (C) No adverse effects on test soldiers were noted in tests from smoke, blast, flash, or noise from the candidate rifles.

2.19.3.1.3 (C) The ejection pattern of the rifles did not interfere with the firer or adjacent firers on line, except that the H-R ejection pattern, of approximately 12 feet to the right front, occasionally interfered with adjacent firers.

2.19.3.1.4 (C) Heat transfer from the M14, S-R, XM16E1, and the A-R was insignificant in semiautomatic fire. With the H-R, after firing four 20-round magazines in sustained semiautomatic fire, the heat transfer was so great that it could not be carried at the ready position or sling arms. In automatic fire, all of the rifles became intensely hot and had to be handled carefully. Six M14 forestocks caught on fire during large burst sustained automatic fire testing. All of the rifles, after exposure to the sun in open areas, became hot in varying degrees, but not to the extent that they could not be handled by the test soldiers.

2.19.3.1.5 (C) The M14 safety and firing selector are separate items, located at different points on the rifle. The S-R, XM16E1, H-R, and A-R have a combination fire selector and safety switch; the selector switch on these rifles, as well as the safety on the M14, was identifiable by touch, and operated with a minimum of motion by the firer in all firing positions. When the stock of the A-R is folded, it covers the selector switch which is located on the left side of the receiver. Located on the right side of the A-R receiver is an alternate safety-selector switch (fig 78, App V) to be used when the stock is folded. There is no pointer, or similar indicator device, on this alternate switch to indicate settings. At night, some test soldiers thought they had the alternate switch set on "SAFE" when in fact it was set on "AUTO."

2.19.3.1.6 (C) The rifle sights were easily located and identified by touch. However, the adjustment of the sights of the XM16E1, S-R, A-R, and zeroing adjustment of the H-R rotary rear sight, was time consuming and somewhat difficult in other than the prone position.

2.19.3.1.7 (C) Operation of safeties, controls, and sights was difficult in varying degrees with all of the candidate rifles when the firer wore arctic clothing, gloves, CB protective mask, and CB protective clothing. It was extremely difficult to obtain a proper sight picture with all the candidate rifles while wearing the CB protective mask



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2.19.3.1.8 (C) Recoil of the 5.56-mm rifles in the semiautomatic mode did not have an adverse effect on the firer, nor pose any particular difficulty in firing from the hip or shoulder. The recoil of the M14 in the semiautomatic as well as the automatic mode caused discomfort to the firer's shoulder. During Sub-Test No 3, Rate of Fire, test soldiers complained of discomfort caused by the M14 when firing bursts in excess of five rounds each from the shoulder.

2.19.3.1.9 (C) The S-R, XM16E1, and A-R were reported by the manufacturers to have a recoil pad. However, evaluation throughout testing indicated that the S-R recoil pad was the only one which effectively absorbed recoil.

2.19.3.1.10 (C) Pointing characteristics of the candidate rifles, except for the XM16E1, were similar and satisfactory. The XM16E1 was significantly less effective in the semiautomatic pointed fire role (ref Table 12-1, Sub-Test No 12, Pointed Fire Accuracy).

2.19.3.1.11 (C) The candidate rifles did not have any noticeable imbalance that affected their carrying or pointing characteristics. The M14 is noticeably more muzzle heavy when carried at the ready position with bipod attached.

2.19.3.1.12 (C) Three-point support was achieved by all firers with all candidate rifles in the prone firing position.

### 2.19.3.2 (C) Carbines (U)

2.19.3.2.1 (C) The candidate carbines were fired from the right and left shoulder in all normal firing positions, without difficulties, by test soldiers wearing temperate clothing and equipment. They were also capable of being fired by soldiers wearing arctic clothing, gloves, and CB protective mask and clothing, except that the M14 could not be fired by soldiers wearing arctic mittens. In this regard, there is a winter trigger kit (though not furnished for this test) which enables the M14 to be fired when the firer wears arctic mittens.

2.19.3.2.2 (C) No adverse effects on test soldiers were noted in tests from smoke, blast, flash, or noise from the M14 and the S-C. The C-SMG, however, produced excessive noise, blast, and flash in firing tests when 5.56-mm ammunition loaded with ball-type propellant was used. The muzzle flash produced by the C-SMG when fired at night destroyed the firer's night vision (fig 27, App V). Near the end of test, 5.56-mm ball ammunition loaded with CR propellant was furnished for test with the C-SMG. The flash and noise produced by this ammunition in the C-SMG was significantly less than with ball propellant ammunition (ref Sub-Test No 11, Signature Effects, Carbines).

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2.19.3.2.3 (C) The ejection pattern of the M14 and C-SMG did not interfere with the firer or adjacent firers. However, the S-C has an ejection pattern of approximately 10 feet to the right front, which interfered with adjacent firers in some cases.

2.19.3.2.4 (C) The heat transfer of the C-SMG was significantly higher than the other candidate carbines in the semiautomatic mode. Moreover, during the sustained automatic firing exercises, the C-SMG heat transfer, after two 30-round magazines had been fired, was so great that the firer could no longer grasp the forward handguard of the carbine and had to modify his firing position by grasping the carrying handle. In the automatic mode, all candidate carbines had a large amount of heat transfer in sustained firing with large burst sizes. The stocks of five M14's caught on fire in these tests. In open areas under bright sunlight, all candidate carbines sustained a large amount of heat absorption but not to the extent that they could not be handled.

2.19.3.2.5 (C) The M14 safety and firing selector are separate items, located at different points on the rifle. The C-SMG and S-C have a combination fire selector and safety switch; the selector switch on these carbines, as well as the safety on the M14, was identifiable by touch and operated with a minimum of motion by the firer in all firing positions.

2.19.3.2.6 (C) The carbine sights were easily located and identified by touch. However, adjusting the front sight of the C-SMG and S-C was time consuming and somewhat difficult in other than the prone position.

2.19.3.2.7 (C) Operation of the safety, sight, and controls was more difficult in varying degrees on the carbines when the firer wore arctic and CB protective clothing. It was extremely difficult to obtain a proper sight picture with all the candidate carbines while wearing the CB protective mask.

2.19.3.2.8 (C) Recoil of the 5.56-mm carbine in the semiautomatic mode did not have an adverse effect on the firer, nor pose any particular difficulty in firing from the hip and shoulder. The recoil of the M14 in the semiautomatic as well as the automatic mode caused discomfort to the firer's shoulder. During Sub-Test No 3, Rate of Fire, test soldiers complained of discomfort caused by the M14 to the shoulder when firing bursts in excess of five rounds each.

2.19.3.2.9 (C) The candidate carbines did not have any significant imbalance that affected the carrying or pointed characteristics of the carbines. With respect to pointing characteristics, accuracy results in Sub-Test No 12, Point Fire Accuracy, were significantly better with the S-C than with the C-SMG and the M14 (ref Table 12-2, Sub-Test No 12, Pointed Fire Accuracy).

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2.19.3.2.10 (C) Three-point support was achieved with all candidate carbines in the prone position. The length of the C-SMG, with stock extended, was such that three-point support in the prone position could be attained; however, it was difficult for some test soldiers.

## 2.19.3.3 (C) Automatic Rifles (U)

2.19.3.3.1 (C) All of the candidate automatic rifles were fired from the right and left shoulder in all normal firing positions, without difficulty, while wearing temperate clothing and equipment. They were also fired by soldiers wearing arctic clothing and CB protective mask and clothing, with the exception of the M14E2 by soldiers wearing arctic mittens. There was no provision on the M14E2 for firing by soldiers wearing the arctic mittens. However, a winter trigger kit was recently tested with satisfactory results in the Arctic and should be available for use in the near future.

2.19.3.3.2 (C) When questioned as to whether they experienced any undue discomfort from blast and noise with the candidate automatic rifles, the test soldiers stated that the noise made by the M14E2 was significantly louder than made by the C-AR and the S-AR, and that this noise caused some discomfort. The test soldiers further stated that the S-AR sometimes emitted smoke and fumes which irritated their eyes and made sighting difficult. There was more flash from the M14E2 than with the other two automatic rifles. No significant differences as to blast were noted.

2.19.3.3.3 (C) The ejection patterns of the M14E2 and the C-AR did not interfere with adjacent firers nor with the firer's ability to aim and fire accurately from any position. The ejection pattern of the S-AR did not interfere with adjacent firers; however, it interfered with a right-handed firer in any position which required him to grasp the forestock with his left hand. In such a position, hot brass was ejected onto the firer's left wrist, the brass occasionally going in his sleeve. This detracted from his ability to aim and fire accurately.

2.19.3.3.4 (C) After firing approximately 200 rounds in the M14E2, using 3-round bursts in an assault exercise, the front underside of the stock would occasionally burst into flame. Although the firer had a front pistol grip which did not absorb heat, the burning stock detracted from the firer's ability to aim and fire accurately. (See Sub-Test No 16, Durability and Reliability). The front handguard of both the C-AR and the S-AR became hot during extended firing exercises, and during Sub-Test No 3, Rate of Fire, the C-AR firers had to wear gloves while firing the larger burst sizes. The barrels of all three candidate automatic rifles became too hot to touch during most firing exercises. None of the candidate automatic rifles became difficult to handle due solely to heat absorption from the sun.

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2.19.3.3.5 (C) The safeties and controls of all three candidate automatic rifles were minimal in number, easily located and identified by touch, and operated with a minimum of motion by the firer (in all firing positions) to include while wearing complete arctic clothing and CB protective clothing-with the exception previously noted regarding firing the M14E2 while wearing arctic mittens. (See Sub-Test No 18, Safety, regarding the use of a combination safety-selector switch.) All of the safeties and controls were more difficult to manipulate when wearing gloves or mittens.

2.19.3.3.6 (C) The sights of all three candidate automatic rifles were easily located and identified by touch by the firer (in all firing positions) to include while wearing complete arctic clothing and CB protective clothing. The sights of the M14E2 were operable with a minimum of motion under the conditions listed above. The sights of the C-AR and the S-AR were not operable with a minimum of motion (see Sub-Test No 4, Sights). All of the sights were more difficult to manipulate when wearing gloves or mittens. The necessity to make adjustments to both the front and rear sights of the C-AR and the S-AR was confusing (see Sub-Test No 4, Sights). It was extremely difficult to obtain a proper sight picture with the M14E2 and C-AR while wearing the CB protective mask. Aiming with the offset (to the left) sights of the S-AR was difficult and awkward for most left-handed firers.

2.19.3.3.7 (C) When fired from the shoulder, the recoil of the M14E2 was sufficient to cause discomfort to some of the test soldiers. When fired from the shoulder or the hip, the recoil of the C-AR and the S-AR was not sufficient to cause discomfort to any of the test soldiers. All three candidate automatic rifles had recoil pads; however, the recoil pad of the C-AR was little more than a hard-rubber butt plate. The C-AR utilized an internal buffer system to reduce recoil.

2.19.3.3.8 (C) The configuration and design of all of the candidate automatic rifles were suitable with respect to pointing characteristics. While the balance of the S-AR was relatively further forward than that of the C-AR and M14E2, the results of pointed fire accuracy testing (ref Table 12-3, Sub-Test No 12, Pointed Fire Accuracy) indicate that the S-AR had better pointing characteristics than the other two candidates.

2.19.3.3.9 (C) The lengths of all three candidate automatic rifles were sufficient to allow three-point support when the firer was in the prone position.

2.19.3.3.10 (C) None of the candidate automatic rifles had projections which caused discomfort or injury to the firers during the course of testing.

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## 2.19.3.4 (C) Machine Guns (U)

2.19.3.4.1 (C) The size and shape of the candidate machine guns permitted firing by test soldiers in all positions, without difficulty, including from right or left shoulder, and the bipods when wearing complete temperate field clothing, arctic clothing, and CB protective clothing and mask, with one exception. The M60 could not be fired while wearing the arctic mitten, but could be fired by a soldier wearing the arctic mitten, trigger finger.

2.19.3.4.2 (C) Test soldiers stated that they experienced no significant amount of discomfort from the noise and blast of the candidate machine guns. On occasion there were emissions of gases and particles from the Code-S machine guns, during firing, which were dangerous to the assistant gunner when he assumed the best position to the left of the gun to assist in feeding and loading ammunition belts. In addition, test soldiers commented that the amount of gas produced in firing the Code-S machine guns sometimes affected their ability to see and to accurately fire the gun.

2.19.3.4.3 (C) The ejection pattern of the M60, which varied from 1 to 15 feet to the right of the gun, sometimes interfered with adjacent firers. The ejection pattern of the Code-S machine guns, which is downward, did not interfere with adjacent gun crews, but prevented the test soldiers from keeping their hand on the elevating handwheel of the S-MMG when firing in the prone position (ref Sub-Test No 2, Training). Assumption of an alternate position to avoid this occurrence affected the gunner's ability to make quick changes with the traversing and elevating mechanism.

2.19.3.4.4 (C) No effects on the firer were noted from rapid or sustained fire, or exposure to the sun, with the M60. The rapid build-up of heat in sustained firing, as well as safety restrictions imposed, limited the number of rounds that could be fired with the Code-S machine guns without a barrel change.

2.19.3.4.5 (C) The safeties, sights, and controls of the candidate machine guns were easily located and identified by touch. The operation of the Code-S machine gun sights could not always be done with a minimum of motion, because adjustments were required on both the front and rear sights when zeroing. Operation of all sights and controls was difficult while test soldiers were wearing arctic mittens and CB protective clothing and masks. Adjustment of the S-LMG bipod legs by soldiers wearing arctic mittens or gloves was difficult. Making large shifts in elevation on the S-LMG could not be done rapidly, as there is no fast adjustment feature in the design of the rear sight. The small aperture of the Code-S-MG made sighting and observation difficult when firing under low visibility conditions and at wide area targets (ref Sub-Test No 4, Sights).

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2.19.3.4.6 (C) The test soldiers expressed a preference for the lighter recoil of the Code-S machine guns over the heavier one of the M60. However, none of the test soldiers considered the recoil of the M60 to be excessive. The recoil of the candidate machine guns was not such as to prevent firing from the shoulder, underarm, or the hip.

2.19.3.4.7 (C) Test soldiers commented that they had cut their hands on the circular projection of the feed tray of the Code-S machine guns when operating the cocking handle.

2.19.4 (C) ANALYSIS (U)

2.19.4.1 (C) Rifles (U)

2.19.4.1.1 (C) There are no significant differences between the candidate rifles as to capability of being fired from either the right or left shoulder in all normal firing positions when wearing temperate clothing and equipment. The M14, A-R, and H-R cannot be fired by soldiers wearing arctic mittens. The trigger guard of the S-R is removable, and the XM16E1 trigger guard can be folded, permitting firing when the arctic mitten is worn. There is a winter trigger kit available for the M14. The inability to fire the A-R and H-R when wearing arctic mittens is considered significant.

2.19.4.1.2 (C) There are no significant differences between the candidate rifles as regards effects on the firer from smoke, blast, flash or noise.

2.19.4.1.3 (C) There are no significant differences between the candidate rifles in the effects of their ejection patterns upon the firer. However, the H-R's ejection pattern is greater in length than that of the other candidate rifles and can interfere with adjacent firers. This is not considered significant.

2.19.4.1.4 (C) All of the candidate rifles become extremely hot in a relatively short time when firing sustained automatic fire. The H-R reaches a hard to handle, hot condition more quickly than the other candidate rifles in semiautomatic sustained fire. The M14 is susceptible to burning when fired in sustained automatic fire in large bursts. The differences between the candidate rifles with respect to heat build-up, both from firing and exposure to the sun, are not considered significant. Caution must be exercised with all of them, when handling during and after sustained firing.

2.19.4.1.5 (C) The M14 has the most effective safety and the easiest means of adjusting sights. The controls of the XM16E1, S-R, A-R, and H-R require the least amount of motion to operate, but more training is required to become familiar with them. Identification of the alternate selection switch of the A-R (for use when stock is folded)

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is not positive. This is significant. Zeroing of sights is significantly easier with the M14 and requires less motion than with the XM16E1, A-R, and S-R, which often require adjustment of both front and rear sight, and the H-R which requires special tools for zeroing. All of the candidate rifle sights and controls are significantly more difficult, but comparable, to operate when wearing arctic and CB protective clothing and mask. It is undesirably difficult to obtain a proper sight picture with all of the candidate rifles while wearing the CB protective mask.

2.19.4.1.6 (C) There are no significant differences between the candidate rifles with respect to discomfort caused by recoil when fired from the hip. When fired from the shoulder, discomfort to the firer caused by recoil is significantly less with the 5.56-mm candidates than with the M14.

2.19.4.1.7 (C) The M14, H-R, S-R, and A-R are comparable in pointed fire accuracy, which indicates comparable pointing characteristics. The XM16E1 is significantly less effective in pointed fire accuracy than the other candidate rifles, which indicates poor pointing characteristics. This is significant.

2.19.4.1.8 (C) The length of all of the candidate rifles is adequate with respect to the capability of the firer to achieve 3-point support in the prone position.

## 2.19.4.2 (C) Carbines (U)

2.19.4.2.1 (C) All of the candidate carbines are capable of being fired from either the right or left shoulder, without difficulty, when wearing temperate and arctic clothing, gloves, and CB protective clothing and mask. However, the M14 requires the use of its winter trigger kit for firing when wearing arctic mittens. All are more difficult but comparable, to fire when wearing arctic or CB protective clothing and mask.

2.19.4.2.2 (C) The M14 and S-C are comparable as to effects upon the firer from smoke, blast, flash, and noise. The C-SMG, when firing ball type propellant ammunition, produces significantly more noise, blast, and flash than the other two carbines. This is unacceptable. With CR type propellant ammunition, the noise, blast, and flash produced by the C-SMG is significantly less than with the ball type propellant and is considered acceptable.

2.19.4.2.3 (C) There is no significant difference between the candidate carbines as to interference to the firer caused by their ejection patterns. The ejection pattern of the S-C could cause interference with adjacent firer, but this is not considered significant.

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2.19.4.2.4 (C) There is no significant difference between the M14 and the S-C with respect to heat transfer from firing semiautomatic fire, nor with any of the candidate carbines with respect to heat build-up from exposure to the sun. However, the effect of heat transfer with the C-SMG in sustained fire is significantly greater on the firer than with the other two candidate weapons. The wooden forestock of the M14 is susceptible to burning when firing long bursts in sustained automatic fire.

2.19.4.2.5 (C) The M14 has the most effective safety and the easiest means of adjusting sights. The controls of the C-SMG and the S-C require the least amount of motion to operate, but more training is required with them to ensure complete reliability. Zeroing of the C-SMG and S-C sights is more time consuming than with the M14 sight, as the two former often require adjustment of both front and rear sights. Operation of all sights and controls is more difficult, but comparable, when the firer is wearing arctic or CB protective clothing and mask. It is undesirably difficult to obtain a proper sight picture with all of the candidate carbines while wearing the CB protective mask.

2.19.4.2.6 (C) There are no significant differences between the candidate carbines in the amount of discomfort due to recoil when fired from the hip. When fired from the shoulder, the discomfort caused by recoil of the C-SMG and S-C is significantly less than that of the M14.

2.19.4.2.7 (C) While some firers have difficulty in achieving 3-point support in the prone position with the C-SMG, the differences between the candidate weapons in this respect are not considered significant.

## 2.19.4.3 (C) Automatic Rifles (U)

2.19.4.3.1 (C) The M14E2 and the C-AR are comparable with respect to capability of being fired from the right or left shoulder, without difficulty, in all normal firing positions. The ejection pattern of the S-AR, which may cause hot brass to go down the left sleeve of a right-hand firer, interferes with positioning of the forestock in the left hand. This is objectionable. The M14E2 needs a winter trigger kit (recently tested in the Arctic with satisfactory results) to enable the firer to fire when wearing arctic mittens. Firing of all of the candidate weapons is more difficult but acceptable when the firer is wearing arctic or CB protective clothing.

2.19.4.3.2 (C) While the severity of the blast and noise of the M14E2 is greater than that of the C-AR and S-AR, it is not considered significantly so.

2.19.4.3.3 (C) There is no significant difference between the candidate weapons as to effects caused by heat from exposure to the sun. In



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sustained firing, the heat from the stock of the M14E2 detracts from the firer's ability to aim, and the front handguard of the C-AR becomes too hot to hold with the bare hand. Both of these characteristics are undesirable.

2.19.4.3.4 (C) The M14E2 has the most effective safety. The controls of the C-AR and the S-AR require the least motion to operate, but require more training to be reliable, especially for night use. The M14E2 sights are the easiest to operate under all conditions. The C-AR and S-R sights, which often require adjustment of both front and rear sight in zeroing, are not operable with a minimum of motion. All sights and controls are more difficult to operate when wearing arctic or CB clothing and mask. It is undesirably difficult to obtain a proper sight picture with the M14E2 and the C-AR while wearing the CB protective mask. The inability of some left-handed soldiers to aim the S-AR because of the sights being off-set to the left is also undesirable.

2.19.4.3.5 (C) The effect of recoil upon the firer when firing from the hip is comparable between the candidate weapons. However, the effect of recoil upon the firer when firing from the shoulder was significantly less with the C-AR and S-AR than with the M14E2.

2.19.4.3.6 (C) With respect to the number, location, identification by touch, and operation with a minimum of motion by the firer (in all firing positions) to include while firer is wearing complete arctic clothing and CB protective clothing, the safeties and controls of all three candidate automatic rifles are considered comparable.

2.19.4.3.7 (C) The results of pointed fire accuracy tests (Sub-Test No 12, Pointed Fire Accuracy, Table 12-3) indicate that the S-AR is better than the other automatic rifle as to pointing characteristics. This is significant.

2.19.4.3.8 (C) All of the candidate automatic rifles are long enough to enable the firer to achieve 3-point support in the prone position. There are no significant differences in this characteristic.

### 2.19.4.4 (C) Machine Guns (U)

2.19.4.4.1 (C) The candidate machine guns are comparable with respect to their capability of being fired from a bipod, from the right and left shoulder, and from a sustained fire mount when the firer is wearing complete temperate, arctic, and CB protective clothing and mask.

2.19.4.4.2 (C) There are no significant differences between the candidate machine guns as to firer discomfort caused by blast and noise.

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2.19.4.4.3 (C) There are no significant differences between the candidate machine guns as to effects of their ejection patterns on adjacent firers. However, the downward ejection pattern of the Code-S machine gun, causing hot brass to strike the gunner's hand when the gun is tripod mounted, interferes with manipulation of the elevating handwheel. This is very undesirable.

2.19.4.4.4 (C) The differences between the candidate machine guns with respect to heat build-up and transfer are significant. Those characteristics are acceptable in the M60. The rapid heat build-up and the resultant safety restrictions made the Code-S machine guns unacceptable for Infantry use.

2.19.4.4.5 (C) There are no significant differences between the candidate machine guns with respect to number, location, and identification of sights, safeties, and controls. The sights of the M60 are easier to zero than those of the Code-S, since the latter sometimes require adjustment of both the front and rear sight. However, the ability to zero the front sight of each barrel in elevation is sometimes an advantage with a quick barrel change type machine gun, since each of the assigned barrels can be zeroed to its gun. Large elevation changes can be made much more quickly on the rear sight of the M60 than on the Code-S. The open-type rear sight of the M60 is better than the small aperture-type one of the Code-S when aiming under low visibility conditions and when firing at wide area targets. The bipod legs of the S-LMG are difficult to adjust when the gunner is wearing arctic mittens.

2.19.4.4.6 (C) There are no significant differences between the candidate machine guns in the area of effects of recoil upon the firer's capability to fire from the shoulder, underarm, or hip.

2.19.4.4.7 (C) The Code-S emits more gases and particles in the area of the feed port during firing than does the M60. On occasion these emissions are dangerous and prevent the assistant gunner from taking the best position next to the gun to assist in loading and feeding ammunition into the gun.

### 2.19.4.5 (C) Deficiency of the Candidate Weapons (U)

#### Code-S Machine Gun:

Emission of gases and particles from the feed port in sustained firing is dangerous and prevents the assistant gunner from positioning himself in the best position for feeding and loading ammunition into the gun.

### 2.19.4.6 (C) Shortcomings of the Candidate Weapons (U)

#### 2.19.4.6.1 (C) M14 and M14E2:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon.

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b. (C) Recoil causes discomfort to the firer in sustained firing.

c. (C) Forestock is susceptible to burning in sustained automatic fire.

### 2.19.4.6.2 (C) S-R:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire causes difficulty in handling the weapon.

b. (C) Sight is not operable with a minimum of motion.

### 2.19.4.6.3 (C) H-R:

a. (C) Rapid build-up and transfer of heat in sustained semi-automatic fire cause difficulty in handling the weapon.

b. (C) Sights not operable with a minimum of motion.

c. (C) Inability to use trigger when the soldier wears arctic mittens.

### 2.19.4.6.4 (C) A-R:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon.

b. (C) Sights not operable with a minimum of motion.

c. (C) Inability to use trigger when the soldier wears arctic mittens.

### 2.19.4.6.5 (C) XM16E1:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon.

b. (C) Sights not operable with a minimum of motion.

c. (C) Poor pointing characteristics:

### 2.19.4.6.6 (C) E-C, C-SMG, and C-AR:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon.

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b. (C) Sights not operable with a minimum of motion.

## 2.19.4.6.7 (C) S-AR:

a. (C) Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon.

b. (C) Sights not operable with a minimum of motion.

c. (C) Some left-handed firers could not use the off-set (to the left sights).

d. (C) The downwear ejection of hot brass prevents the soldier from properly grasping the forestock and detracts from his ability to aim and fire.

## 2.19.4.6.8 (C) Code-S Machine Gun:

a. (C) The downward ejection pattern of hot brass interferes with operation of the elevating handwheel by the gunner when the gun is mounted on the tripod.

b. (C) Adjustment of the S-LMG bipod legs is difficult for the soldier wearing arctic mittens.

c. (C) Difficulty in making large range adjustments on the rear sight.

d. (C) The small aperture rear sight makes use of the sight difficult under low illumination conditions and restricts the gunner's field of view when engaging wide area targets.

e. (C) Sights not operable with a minimum of motion.

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## 2.20 (C) SUB-TEST NO 20, VALUE ANALYSIS (U)

### 2.20.1 (C) OBJECTIVE (U)

#### Rifles, Carbines, Automatic Rifles, and Machine Guns

##### General

To determine if the candidate weapons contain any features which are unnecessary, costly, or "nice-to-have" in accordance with USATECOM Regulation 700-1, 15 June 1964.

### 2.20.2 (C) METHOD (U)

#### Rifles, Carbines, Automatic Rifles, and Machine Guns

Throughout all testing, observations were made to determine and test soldiers were instructed to report any nonessential or "nice-to-have" features which could be modified or deleted without compromising the durability, reliability, performance, or safety of the candidate weapons.

### 2.20.3 (C) RESULTS (U)

#### 2.20.3.1 (C) Rifles, Carbines and Automatic Rifles (U)

No nonessential or "nice-to-have" features were determined on any of the candidate rifles, carbines, or automatic rifles.

#### 2.20.3.2 (C) Machine Guns (U)

2.20.3.2.1 (C) The M60-LMG was capable of being converted to the M60-MMG by mounting the M60-LMG on the M122 tripod mount.

2.20.3.2.2 (C) The S-LMG was capable of being converted to the S-MMG by removing the stock assembly and forestock assembly and mounting the S-LMG on the M2 tripod mount by the use of the sub-mount assembly.

2.20.3.2.3 (C) A bipod case was issued for use with each S-LMG. The bipod case had provisions for carrying the same cleaning equipment as is carried in the spare barrel carrying case (ref fig 57 and 63). In addition, a spare barrel carrying case was issued for use with each S-LMG and each S-MMG.

### 2.20.4 (C) ANALYSIS (U)

2.20.4.1 (C) Since the sub-mount assembly and the M2 tripod mount were the only items of equipment necessary to allow the S-LMG to fulfill the

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role of the S-MMG, two separate weapons were not necessary to fulfill the machine gun requirement. The S-LMG and S-MMG should more properly be referred to as a single weapon providing for use of the bipod and tripod whenever appropriate.

2.20.4.2 (C) A pocket for the bipod on the spare barrel carrying case would eliminate the need for a bipod case being carried on the pistol belt, thus eliminating a piece of equipment and reducing the weight and bulk carried by the soldier without compromising the durability, reliability, performance, or safety of the Code S machine guns.

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### SECTION 3 -- APPENDICES

#### APPENDIX I -- REFERENCES

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9. FM 23-31, 40-mm Grenade Launcher, M79, February 1965.
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17. Special Text 23-16-1, US Army Infantry School, Stoner 63 Automatic Rifle, 5.56-mm, July 1965.
18. Special Text 23-16-2, US Army Infantry School, CAR-15 Automatic Rifle, 5.56-mm, July 1965.
19. Special Text 23-67-1, US Army Infantry School, Machinegun, 5.56-mm, Stoner 63, July 1965.
20. Letter, STEAP-DS-TI, USATECOM, 18 August 1965, subject: "Third Statement on Safety Evaluation of Small Arms Weapons Systems (SAWS), USATECOM Project Number 8-5-0400-03."
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22. Letter, STEAP-DS-TI, USATECOM, 20 August 1965, subject: "Fifth Statement on Safety Evaluation of Small Arms Weapons Systems (SAWS), USATECOM Project Number 8-5-0400-03."
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24. Letter, STEAP-DS-TI, USATECOM, 24 August 1965, subject: "Seventh Statement on Safety Evaluation of Small Arms Weapons Systems (SAWS), USATECOM Project Number 8-5-0400-03."
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28. POMM 9-1005-267-12, 5.56-mm Assault Rifle: Stoner 63.
29. POMM 9-1005-279-12, 5.56-mm Rifle T223 and Rifle Bippd.
30. POMM 9-1005-278-12, Rifle, 5.56-mm, AR-18.
31. POMM 9-1005-272-12 and 9-1005-273-12, Sub-machine Gun, 5.56-mm, Colt CAR-15 and Rifle, 5.56-mm, Heavy Assault M1, Colt CAR-15.
32. POMM 9-1005-268-12, 5.56-mm Carbine: Stoner 63.
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34. POMM 9-1005-269-12/1, 5.56-mm, Light Machine gun, Belt-Fed: Stoner 63.
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## APPENDIX II - TEST DATA

**CHART 3-1**

### RATE OF FIRE, RIFLES

**(Without Bipod)**

WPN	ATT. SIZE BURST	200 M						350 M						500 M						600 M						800 M					
		POINT		AREA		POINT		AREA		POINT		AREA		POINT		AREA		POINT		AREA		POINT		AREA							
		HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP								
M14	1	35.0	34.0	30.0	35.0	13.0	13.0	4.0	22.0	10.0	6.0	8.0	8.0	2.0	9.0	8.0															
	3	8.0	8.4	7.1	4.5	2.0	1.7	1.0	1.4	1.4	1.0	5.4	4.4	0.7	2.3	2.3															
	5	3.9	5.2	4.6	3.0	0.6	0.6	0.2	1.8	1.8	0.8	2.2	2.1	0.0	0.0	0.0															
	7	3.8	4.0	3.4	1.6	0.7	0.7	1.1	1.2	1.2	1.1	1.6	1.3	0.1	1.2	1.2															
	10	3.2	5.1	3.0	0.8	0.3	0.3	0.4	0.9	0.9	0.5	1.4	1.2	0.4	1.6	1.5															
	1	52.0	56.0	44.0	18.0	12.0	10.0	2.0	8.0	6.0	16.0	22.0	18.0	2.0	4.0	4.0															
	3	20.9	20.9	17.6	18.9	11.3	8.0	5.2	5.3	5.3	2.1	4.6	4.0	1.4	2.4	2.4															
	5	8.6	4.6	3.9	2.4	1.4	1.4	1.9	1.7	1.7	0.8	4.0	3.7	1.5	1.8	1.4															
	7	3.8	7.5	5.8	2.3	1.5	1.3	2.0	2.6	1.8	3.1	2.5	2.0	0.0	1.5	1.3															
	10	3.9	5.5	3.9	1.2	1.6	1.6	0.2	1.2	1.0	2.2	1.6	1.4	0.0	1.2	0.8															
S-R	1	82.0	42.0	32.0	28.0	14.0	14.0	2.0	6.0	4.0	12.0	20.0	18.0	4.0	2.0	2.0															
	3	13.4	11.1	8.3	8.7	5.4	5.4	2.7	5.5	4.1	2.7	2.7	2.7	0.0	0.0	0.0															
	5	6.4	12.4	8.0	3.4	2.0	1.6	1.2	0.8	0.8	2.1	2.0	2.0	0.8	2.7	2.3															
	7	6.3	6.4	4.7	4.8	0.9	0.9	0.6	0.8	0.8	0.9	1.6	1.3	0.3	0.6	0.6															
	10	4.7	6.4	4.8	2.3	1.2	1.2	0.7	2.0	1.8	0.4	0.8	0.8	0.2	1.2	1.2															
	1	44.0	48.0	38.0	10.0	8.0	8.0	10.0	0.0	0.0	4.0	6.0	6.0	2.0	0.0	0.0															
	3	10.4	9.3	9.3	7.2	2.7	2.7	0.7	0.7	0.7	2.0	0.7	0.7	0.0	2.7	2.7															
	5	8.2	4.7	3.4	1.7	0.4	0.4	1.3	1.3	1.3	0.4	4.3	4.3	0.0	1.7	1.7															
	7	4.4	4.6	3.6	1.8	1.2	0.9	0.0	1.5	1.2	0.3	4.0	3.4	0.0	1.8	1.8															
	10	2.8	7.0	4.3	1.0	0.6	0.6	0.8	1.0	1.0	1.0	1.6	1.0	0.0	0.8	0.8															
H-R	1	58.0	66.0	56.0	24.0	42.0	36.0	12.0	16.0	12.0	4.0	4.0	4.0	6.0	4.0	4.0															
	3	10.1	28.6	15.7	3.3	12.8	10.6	2.8	0.7	0.7	0.7	2.1	2.1	2.5	2.8	2.8															
	5	12.2	18.7	11.3	9.8	6.5	4.8	0.4	0.4	0.4	0.5	2.5	4.8	0.4	1.3	1.3															
	7	7.0	12.1	7.2	4.3	2.4	1.8	0.3	2.9	1.7	1.9	4.0	3.1	0.6	1.7	1.7															
	10	4.9	8.7	5.8	4.0	1.8	1.6	0.6	2.6	1.8	0.8	2.8	2.0	0.2	1.5	1.1															
	XM16E1	1	44.0	48.0	38.0	10.0	8.0	8.0	10.0	0.0	0.0	4.0	6.0	6.0	2.0	0.0	0.0														
		3	10.4	9.3	9.3	7.2	2.7	2.7	0.7	0.7	0.7	2.0	0.7	0.7	0.0	2.7	2.7														
		5	8.2	4.7	3.4	1.7	0.4	0.4	1.3	1.3	1.3	0.4	4.3	4.3	0.0	1.7	1.7														
		7	4.4	4.6	3.6	1.8	1.2	0.9	0.0	1.5	1.2	0.3	4.0	3.4	0.0	1.8	1.8														
		10	2.8	7.0	4.3	1.0	0.6	0.6	0.8	1.0	1.0	1.0	1.6	1.0	0.0	0.8	0.8														
A-R		1	58.0	66.0	56.0	24.0	42.0	36.0	12.0	16.0	12.0	4.0	4.0	4.0	6.0	4.0	4.0														
		3	10.1	28.6	15.7	3.3	12.8	10.6	2.8	0.7	0.7	0.7	2.1	2.1	2.5	2.8	2.8														
		5	12.2	18.7	11.3	9.8	6.5	4.8	0.4	0.4	0.4	0.5	2.5	4.8	0.4	1.3	1.3														
		7	7.0	12.1	7.2	4.3	2.4	1.8	0.3	2.9	1.7	1.9	4.0	3.1	0.6	1.7	1.7														
		10	4.9	8.7	5.8	4.0	1.8	1.6	0.6	2.6	1.8	0.8	2.8	2.0	0.2	1.5	1.1														

**LEGEND:** HC - Hit Capability  
HP - Hit Probability

**Group 4 (downgraded at 3 year intervals,  
Declassified After 12 Years  
POD Dir 5200.10)**

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CHART 3-2

RATE OF FIRE, RIFLES

(With Bipod)

WPN	ATT. SIZE BURST	200 M						350 M						500 M						600 M						800 M					
		POINT		AREA		POINT	AREA		POINT	AREA		POINT	AREA		POINT	AREA		POINT	AREA		POINT	AREA									
		HC	HP	HC	HP		HC	HP		HC	HP		HC	HP		HC	HP		HC	HP		HC	HP	HC	HP						
M14	1	39.0	19.0	16.0	37.0	3.0	3.0	15.0	10.0	9.0	10.0	5.0	5.0	2.0	17.0	9.0															
	3	19.7	23.0	17.3	8.8	4.4	3.4	0.0	3.1	2.7	1.3	4.4	4.1	0.3	3.3	3.3															
	5	6.9	12.6	9.3	2.7	1.2	1.0	0.4	3.3	1.9	2.0	3.3	3.1	0.4	3.2	2.5															
	7	8.4	10.3	6.3	4.1	2.3	1.6	3.4	1.5	1.3	1.4	3.4	2.4	2.3	2.6	2.0															
	10	7.1	9.9	4.9	5.0	1.6	1.5	0.3	2.1	1.5	0.7	2.0	1.9	0.6	1.7	1.5															
	1	50.0	74.0	56.0	36.0	20.0	16.0	6.0	14.0	12.0	8.0	24.0	16.0	10.0	10.0	10.0															
	3	19.6	23.6	17.2	2.7	7.0	5.7	1.9	8.3	4.5	6.0	8.1	6.7	0.6	0.0	0.0															
	5	8.4	19.2	10.6	4.6	3.2	3.2	1.9	7.1	6.3	0.7	5.0	4.1	0.3	1.1	0.6															
	7	9.4	14.0	6.4	5.5	2.1	1.8	4.0	3.6	2.3	1.6	2.4	2.4	0.3	0.5	0.5															
	10	9.6	13.3	4.4	3.3	1.8	1.6	4.0	4.0	2.6	1.3	2.6	1.6	0.4	1.4	1.0															
S-R	1	48.0	36.0	30.0	36.0	10.0	10.0	4.0	12.0	10.0	2.0	10.0	8.0	0.0	0.0	0.0															
	3	17.8	22.8	14.8	6.8	2.5	2.5	1.9	4.6	3.9	0.6	5.3	4.7	0.6	1.3	1.3															
	5	7.8	14.8	8.0	6.4	3.0	2.3	1.5	4.0	2.4	1.1	1.6	1.6	0.4	1.6	1.2															
	7	14.8	16.8	8.3	3.8	2.9	1.7	1.8	1.2	1.2	3.0	2.1	1.8	0.0	1.5	1.2															
	10	8.9	18.1	6.1	2.6	1.0	1.0	0.4	2.0	2.2	1.9	2.0	1.2	0.2	1.8	1.2															
	1	32.0	50.0	36.0	22.0	16.0	10.0	4.0	10.0	10.0	18.0	10.0	8.0	0.0	10.0	8.0															
	3	18.9	13.6	13.0	9.8	2.8	2.8	5.4	3.4	3.4	0.0	4.1	2.7	0.0	0.0	0.0															
	5	8.4	11.1	8.1	4.0	2.1	2.1	2.4	2.0	2.0	0.4	4.1	3.3	1.2	0.4	0.4															
	7	7.9	4.0	3.1	2.6	1.2	1.2	0.3	1.6	1.6	1.2	0.3	0.3	0.0	0.0	0.0															
	10	2.1	8.9	4.7	1.2	0.9	0.6	0.2	1.1	1.1	1.6	0.8	0.8	0.0	0.6	0.6															
H-R	1	64.0	48.0	42.0	46.0	18.0	18.0	2.0	6.0	6.0	10.0	6.0	6.0	2.0	2.0	2.0															
	3	7.8	10.9	9.4	7.0	7.5	7.5	5.9	5.3	5.3	2.0	2.1	2.1	1.3	3.8	3.8															
	5	16.3	13.6	8.9	7.4	4.5	3.6	1.7	9.8	6.0	1.6	3.5	1.7	2.4	1.2	1.2															
	7	7.3	9.1	5.5	3.4	3.5	1.6	4.6	1.5	0.9	1.4	5.2	3.6	0.0	4.2	3.6															
	10	8.2	11.3	5.4	2.3	1.2	1.2	2.3	2.7	1.2	1.2	1.6	1.4	1.1	1.7	1.5															
XM16E1	1	32.0	50.0	36.0	22.0	16.0	10.0	4.0	10.0	10.0	18.0	10.0	8.0	0.0	10.0	8.0															
	3	18.9	13.6	13.0	9.8	2.8	2.8	5.4	3.4	3.4	0.0	4.1	2.7	0.0	0.0	0.0															
	5	8.4	11.1	8.1	4.0	2.1	2.1	2.4	2.0	2.0	0.4	4.1	3.3	1.2	0.4	0.4															
	7	7.9	4.0	3.1	2.6	1.2	1.2	0.3	1.6	1.6	1.2	0.3	0.3	0.0	0.0	0.0															
	10	2.1	8.9	4.7	1.2	0.9	0.6	0.2	1.1	1.1	1.6	0.8	0.8	0.0	0.6	0.6															
A-2	1	64.0	48.0	42.0	46.0	18.0	18.0	2.0	6.0	6.0	10.0	6.0	6.0	2.0	2.0	2.0															
	3	7.8	10.9	9.4	7.0	7.5	7.5	5.9	5.3	5.3	2.0	2.1	2.1	1.3	3.8	3.8															
	5	16.3	13.6	8.9	7.4	4.5	3.6	1.7	9.8	6.0	1.6	3.5	1.7	2.4	1.2	1.2															
	7	7.3	9.1	5.5	3.4	3.5	1.6	4.6	1.5	0.9	1.4	5.2	3.6	0.0	4.2	3.6															
	10	8.2	11.3	5.4	2.3	1.2	1.2	2.3	2.7	1.2	1.2	1.6	1.4	1.1	1.7	1.5															

LEGEND: HC - Hit Capability  
HP - Hit Probability

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CHART 3-3

RATE OF FIRE, CARBINES

(Without Bipod)

WPN	ATT. BURST SIZE	200 M				350 M				500 M				600 M				800 M			
		POINT		AREA		POINT		AREA		POINT		AREA		POINT		AREA		POINT		AREA	
		HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP	HC	HP		
M14**	1	*	35.1	24.2		13.8	11.5		8.2	5.9		8.5	7.3		1.1	1.1					
	3		20.8	13.8		6.6	3.3		1.3	1.3		3.9	2.6		1.2	1.2					
	5		4.5	4.2		1.9	1.9		2.1	2.1		1.5	1.5		0.4	0.4					
	7		5.1	4.0		2.3	1.7		2.4	1.9		3.3	2.7		1.1	1.1					
	10		3.0	2.4		1.2	1.2		2.7	1.9		2.4	2.2		0.4	0.4					
S-C	1	25.7	24.1	18.8	6.9	3.6	3.6	2.0	1.8	1.8	7.3	3.5	3.5	0.8	1.8	1.8					
	3	10.6	14.9	13.6	4.8	4.1	4.1	2.5	2.0	2.0	3.1	3.3	3.3	0.6	2.6	1.9					
	5	7.5	8.2	6.7	1.6	2.8	2.4	2.4	1.8	1.8	0.4	3.5	2.8	0.4	1.2	1.2					
	7	2.6	10.0	6.0	2.9	3.4	2.3	1.4	1.9	1.1	1.2	1.7	1.1	0.3	0.0	0.0					
	10	4.1	4.8	3.0	1.6	2.1	1.7	0.4	2.9	1.9	1.4	0.8	0.8	0.0	0.8	0.8					
C-SMG	1	8.0	6.9	6.1	5.7	3.9	3.1	0.9	1.6	1.6	0.0	2.6	2.6	2.0	0.0	0.0					
	3	9.9	4.6	3.3	5.2	4.0	4.0	1.3	2.6	2.6	0.0	4.5	2.6	0.0	0.6	0.6					
	5	4.8	4.0	4.0	1.8	2.1	1.7	0.8	1.2	0.8	0.4	1.5	1.5	0.0	2.4	2.0					
	7	3.6	7.9	4.1	3.7	1.9	1.7	0.3	1.6	1.6	0.3	1.9	1.9	0.0	3.0	1.3					
	10	4.6	4.1	3.0	1.6	0.8	0.6	1.0	1.2	1.0	0.4	1.6	1.4	0.2	4.0	1.5					

LEGEND:

- HC - Hit Capability
- HP - Hit Probability
- \* - The M14 rifle was not used to engage point targets.
- \*\* - The M14 used duplex ammunition to engage area targets.

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CHART 3-4

RATE OF FIRE - AUTOMATIC RIFLES

(With Bipod)

WPN	ATT. SIZE BURST	200 M			350 M			500 M			600 M			800 M		
		POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP
M14E2	1	31.3	30.4	20.3	24.3	3.1	1.6	4.5	8.1	8.1	7.1	1.6	1.6	0.0	5.4	5.4
	3	29.4	23.5	12.4	12.3	9.3	8.7	3.5	3.1	3.1	4.7	5.8	3.9	2.6	3.2	3.2
	5	9.2	14.8	7.8	3.9	3.9	2.4	3.8	5.1	4.7	2.1	3.9	3.1	2.4	4.0	3.2
	7	11.4	13.6	8.3	5.6	5.2	3.9	1.3	3.4	2.4	3.0	4.4	2.8	0.6	2.3	1.7
	10	5.7	10.8	4.2	1.8	2.8	1.6	2.4	5.0	2.8	2.0	3.0	2.4	0.2	4.9	2.0
C-AR	1	18.5	31.1	21.4	17.0	13.5	11.5	2.0	3.8	3.8	4.0	7.0	5.0	1.0	11.9	5.0
	3	15.9	31.3	22.0	8.9	8.7	7.4	3.4	7.5	5.5	2.7	4.0	4.0	0.0	1.3	1.3
	5	13.6	13.7	5.9	5.7	1.2	1.2	1.3	3.4	3.4	0.4	2.0	1.6	0.0	2.7	2.3
	7	16.1	15.0	8.4	5.7	2.7	2.7	3.9	3.5	3.0	0.8	5.2	3.9	0.5	1.8	1.3
	10	10.5	15.2	5.3	5.3	3.8	2.8	0.8	2.5	4.1	1.4	3.0	2.2	1.0	1.9	1.7
S-AR	1	40.1	23.1	12.5	15.4	10.9	10.9	9.3	5.9	5.9	4.7	1.8	1.8	0.9	5.6	3.7
	3	21.5	30.4	18.9	20.1	15.0	9.5	3.4	4.2	4.2	5.5	3.4	2.1	1.2	1.4	0.7
	5	29.9	26.9	10.7	10.8	5.2	4.0	6.8	8.8	7.2	2.0	4.9	3.8	0.0	1.2	1.2
	7	12.5	25.5	8.4	5.8	9.5	4.6	1.7	5.1	4.6	2.0	3.8	3.0	1.4	1.9	1.6
	10	15.3	23.3	5.8	12.3	2.9	2.1	2.4	3.4	1.6	1.8	2.3	1.2	0.2	3.0	1.4

LEGEND: HC - Hit Capability  
HP - Hit Probability

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CHART 3-5

RATE OF FIRE - AUTOMATIC RIFLES

(Without Bipod)

WPN	ATT. BURST SIZE	200 M			350 M			500 M			600 M			800 M		
		POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP	POINT HC	AREA HC	HP
M14E2	1	33.3	30.4	24.1	10.4	9.3	4.0	7.5	11.4	5.7	9.7	6.5	5.2	2.7	6.0	4.5
	3	15.0	11.0	10.3	6.8	3.4	2.7	0.7	2.0	2.0	2.6	2.0	2.0	0.0	4.2	3.5
	5	12.1	16.6	8.7	11.7	5.2	3.9	0.9	2.4	1.6	2.1	2.0	2.0	2.0	3.5	2.0
	7	3.4	7.6	4.5	3.3	0.6	0.6	1.5	1.4	0.9	3.1	2.9	2.3	1.2	1.1	1.1
	10	3.3	6.8	4.0	5.5	0.4	0.2	0.1	4.0	2.6	0.2	1.2	1.0	0.2	0.2	0.2
C-AR	1	29.2	25.0	18.8	14.6	14.2	10.6	2.7	8.9	5.9	0.0	10.9	8.4	0.9	0.9	0.9
	3	18.2	21.5	16.8	7.5	9.4	8.1	2.8	1.9	1.9	0.7	3.9	3.3	0.0	1.4	1.4
	5	7.4	8.4	5.0	3.3	2.6	2.1	8.4	2.1	2.1	0.8	0.8	0.8	0.4	1.3	0.9
	7	6.2	9.5	4.7	1.8	2.3	2.0	0.3	1.5	1.5	0.3	1.7	1.7	0.6	2.6	1.7
	10	4.4	5.3	3.5	2.6	2.1	1.0	1.2	2.4	2.0	1.0	1.8	1.8	0.0	1.4	1.2
S-AR	1	10.1	11.6	9.8	5.7	4.7	4.7	3.6	5.8	4.8	2.8	5.7	5.7	0.9	2.8	2.8
	3	12.3	18.9	11.5	10.2	7.0	4.2	3.4	2.0	2.0	2.7	2.0	2.0	0.6	1.3	1.3
	5	10.6	9.0	5.9	8.7	2.4	2.0	2.2	3.4	3.4	3.2	2.3	1.9	0.0	0.8	0.8
	7	6.1	6.6	4.0	2.9	4.2	2.5	0.0	1.4	1.4	1.5	4.2	2.8	0.3	2.1	1.1
	10	3.7	4.8	3.1	1.4	2.3	1.9	0.0	1.6	1.6	0.4	1.0	0.8	0.6	1.0	0.4

LEGEND:

HC - Hit Capability

HP - Hit Probability

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CHART 3-6

## RATE OF FIRE, MACHINE GUNS

WEAPON	ATT. BURST SIZE	300 M			500 M			1,000 M		
		HC	HP	PTH	HC	HP	PTH	HC	HP	PTH
M60-LMG	3	21.2	14.0	50.6	20.6	11.3	40.6	5.9	4.6	16.8
	6	21.1	9.1	53.1	13.3	7.3	35.6	6.7	4.0	15.0
	10	13.3	4.8	45.6	9.1	4.0	36.2	4.8	2.8	15.6
	15	14.1	3.7	48.1	12.2	3.7	33.7	4.0	2.4	16.2
M60-MMG	3	21.2	13.0	66.8	12.5	8.7	53.7	4.3	3.7	29.3
	6	20.5	9.3	68.1	21.4	9.0	65.6	6.5	5.3	38.7
	10	16.0	6.0	60.0	11.9	5.4	51.2	6.3	4.1	28.1
	15	14.3	3.9	65.6	10.6	3.7	41.8	3.7	2.3	21.8
S-LMG	3	17.1	12.1	62.5	16.4	9.6	51.8	4.5	4.1	36.8
	6	16.1	7.8	73.7	14.9	6.6	66.8	4.8	3.6	50.0
	10	13.2	5.0	65.0	12.1	4.3	55.6	5.5	3.3	42.5
	15	13.3	4.2	61.2	13.5	3.7	40.6	2.5	1.8	31.2
S-MMG	3	22.2	12.3	67.5	13.1	8.6	68.7	4.6	4.2	44.3
	6	16.1	8.6	71.8	9.8	5.5	68.7	3.2	2.9	43.1
	10	12.5	4.7	74.3	5.9	3.1	65.0	3.5	2.4	31.8
	15	11.4	3.7	65.0	10.4	3.5	61.8	3.0	1.9	33.7

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent Target Hits

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RANGE (meters) 100

DAY DEFENSE - RIFLES

SEMI-AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec)

CHART 7-1

11-7

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1040	178	17.1	65	6.3	67.6	3.1	3.7
M14	M62	1227	187	15.2	67	5.5	69.8	2.9	3.9
M14	M138	1097	279	25.4	71	6.5	74.0	2.4	3.1
S-R	M132	394	59	15.0	19	4.8	79.2	5.9	4.9
S-R	M135	354	45	12.7	17	4.8	70.8	5.1	3.8
XM15E1	M135	302	58	19.2	17	5.6	70.8	7.5	4.8
XM15E1	M135	288	74	25.7	17	5.9	70.8	10.3	6.2
H-R	M193	245	40	16.3	15	6.1	62.5	6.4	3.3
H-R	M193	429	80	18.7	18	4.2	75.0	7.5	6.7
A-R	M193	247	58	23.5	17	6.9	70.8	9.2	4.8
A-R	M135	234	60	25.6	19	8.1	79.2	10.3	5.0

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 200

DAY DEFENSE - RIFLES

CHART 7-2

TARGET EXPOSURE TIME (sec) 6

SEMI-AUTOMATIC FIRE

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1414	152	10.8	65	4.6	67.6	2.0	2.1
M14	M62	1447	124	8.6	70	4.8	73.0	1.6	1.7
M14	M138	1398	231	16.6	70	5.0	73.0	1.6	1.8
S-K	M133	549	49	8.9	20	3.6	83.3	3.5	2.7
S-R	M135	498	40	8.0	16	3.2	66.7	3.2	2.2
XM16E1	M193	390	54	13.9	17	4.4	70.8	5.4	3.0
XM16E1	M136	396	67	16.9	22	5.6	91.7	6.8	3.7
H-R	M195	290	28	9.7	15	5.2	62.5	3.8	1.6
H-K	M195	392	73	18.6	20	5.1	83.3	7.5	4.1
A-R	M193	320	21	6.6	10	3.1	41.7	2.6	1.2
A-R	M155	273	24	8.8	11	4.0	45.8	3.5	1.3

CONFIDENTIAL

LEGEND:

- HC - Hit Capability
- HP - Hit Probability
- PTH - Percent of Targets Hit
- H/PD - Hits/Pound of Ammunition
- H/S - Hits/Second of Firing Time/Squad

CONFIDENTIAL

RANGE (yards) 275

SEMI-AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec.) 6

WEAPON	AMMO	RDS FIELD	TGT. HITS	AC	TGTS HIT	HP	PTH	R/PTD	H/S
M16	M30	1284	67	5.2	40	3.1	41.7	1.0	0.9
M16	M62	1354	69	5.1	37	2.7	38.6	1.0	1.0
M16	M198	1345	129	9.6	56	4.2	58.3	0.9	1.0
S-R	M113	530	14	2.6	10	1.9	41.7	1.0	0.8
S-R	M113	464	12	2.6	7	1.5	29.2	1.0	0.7
XM16E1	M193	384	30	7.8	13	3.4	54.2	3.1	1.7
XM16E1	M193	323	26	8.1	12	3.7	50.0	3.2	1.4
H-R	M193	364	23	6.3	12	3.3	50.0	2.5	1.3
H-R	M193	402	16	4.0	8	2.0	33.3	1.6	0.9
A-R	M193	254	28	11.0	15	5.9	62.5	4.3	1.6
A-R	M193	210	20	9.5	10	4.8	41.7	3.8	1.1

LEGEND:  
 HC - Hit Capability  
 HP - Hit Probability  
 PTH - Percent of Targets Hit

R/PTD - Hits/Pound of Ammunition  
 H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 350

DAY DEFENSE - RIFLES

CHART 7-4

SEMI-AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 6

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1769	112	6.3	37	2.1	30.8	1.2	1.6
M14	M62	1900	72	3.8	42	2.2	35.0	0.7	1.0
M14	M198	1787	125	7.0	49	2.7	40.8	0.7	0.9
S-K	M193	562	23	4.1	8	1.4	26.6	1.6	1.3
S-R	M135	534	18	3.4	9	1.7	30.0	1.4	1.0
XM15E1	M193	435	31	7.1	11	2.5	36.6	2.8	1.7
XM15E1	M16	414	24	5.8	12	2.9	40.0	2.3	1.3
H-R	M193	327	4	1.2	4	1.2	13.3	0.5	0.2
H-R	M193	418	22	5.3	9	2.2	30.0	2.1	1.2
A-R	M193	555	22	4.0	13	2.3	43.3	1.6	1.2

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-5

DAY DEFENSE - RIFLES

RANGE (meters) 500

TARGET EXPOSURE TIME (sec) 6

SEMI-AUTOMATIC FIRE

EA/FCM	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1253	32	2.6	22	1.8	23.0	0.5	0.4
M14	M62	1381	27	2.0	22	1.6	23.0	0.4	0.4
M14	M198	1373	58	4.2	28	2.8	39.6	0.5	0.6
S-R	M193	449	12	2.7	10	2.2	41.7	1.1	0.7
S-R	M193	502	5	1.0	5	1.0	20.8	0.4	0.4
XM16E1	M193	344	9	2.6	8	2.3	33.3	1.0	0.5
XM16E1	M193	347	6	1.7	5	1.4	20.8	0.7	0.3
H-R	M193	355	7	2.0	5	1.4	20.8	0.8	0.4
H-R	M193	366	8	2.2	7	1.9	29.2	0.9	0.4
A-R	M193	402	12	3.0	8	2.0	33.3	1.2	0.7
A-R	M193	326	11	3.4	8	2.5	33.3	1.4	0.6

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CONFIDENTIAL

RANGE (meters) 600

CHART 7-6

DAY DEFENSE - RIFLES

SEMI-AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 10

WEAPON	ammo	RDS FIRED	TGT HITS	RC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1702	54	3.2	38	2.2	39.6	0.6	0.4
M14	M62	1837	68	3.7	53	2.9	55.3	0.7	0.6
M14	M138	1728	61	3.5	44	2.6	45.9	0.3	0.3
S-R	M133	649	21	3.2	18	2.8	75.0	1.3	0.7
S-R	M135	579	11	1.9	9	1.6	37.5	0.8	0.4
XM136E1	M136	458	14	3.1	10	2.2	41.7	1.2	0.5
XM136E1	M136	437	17	3.9	7	1.6	29.2	1.6	0.6
H-R	M135	448	22	4.9	15	3.4	62.5	1.9	0.7
H-R	M135	424	16	3.8	12	2.8	50.0	1.5	0.5
A-R	M133	447	11	2.5	11	2.5	45.8	1.0	0.4
A-R	M133	451	10	2.2	10	2.2	41.7	0.9	0.3

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-7

DAY DEFENSE - RIFLES

RANGE (meters) 800

SEMI-AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 10

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1666	43	2.6	26	1.6	27.1	0.5	0.4
M14	M62	1788	63	3.5	42	2.4	23.8	0.7	0.9
M14	M198	1736	20	1.2	16	0.9	16.7	0.1	0.2
S-R	M193	663	15	2.3	10	1.5	41.7	0.9	0.5
S-R	M193	607	2	0.3	2	0.3	8.3	0.1	0.1
XM16E1	M193	464	3	0.7	3	0.7	12.5	0.3	0.1
XM16E1	M193	449	3	0.7	3	0.7	12.5	0.6	0.1
H-R	M193	483	7	1.5	4	0.8	16.7	0.6	0.2
H-R	M193	427	5	1.2	4	0.9	16.7	0.5	0.2
A-R	M193	455	7	1.5	4	0.9	16.7	0.6	0.2
A-R	M193	433	13	3.0	11	2.5	45.8	1.2	0.4

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

CONFIDENTIAL

CONFIDENTIAL

RANGE (meters) 100

DAY DEFENSE - RIFLES

CHART 7-8

TARGET EXPOSURE TIME (sec) 4

AUTOMATIC FIRE

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1658	187	11.3	75	4.5	78.2	2.1	3.9
M14	M62	1685	156	9.3	66	3.9	68.8	1.7	3.2
M14	M138	1692	324	19.2	80	4.7	83.5	5.7	3.8
S-R	M133	470	54	11.5	18	3.8	75.0	4.5	4.5
S-R	M135	421	86	20.4	20	4.8	83.3	8.2	7.2
XM15E1	M193	443	69	15.6	21	4.7	87.5	6.1	5.8
XM15E1	M136	444	87	19.6	22	5.0	91.7	7.8	7.2
H-R	M193	414	34	8.2	18	4.4	75.0	3.2	2.8
H-R	M195	487	71	14.6	16	3.3	66.7	5.9	5.9
A-R	M193	380	45	11.8	17	4.5	70.8	4.7	3.8
A-R	M195	361	41	11.4	13	5.0	75.0	4.6	3.4

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CONFIDENTIAL

CHART 7-9

DAY DEFENSE - RIFLES

RANGE (meters) 200

AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 6

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	1879	144	7.7	68	3.6	71.0	1.4	2.0
M14	M62	1955	147	7.5	67	3.4	69.8	1.4	2.0
M14	M198	1865	240	12.9	75	4.0	78.2	1.3	1.9
S-K	M193	540	45	8.3	16	3.0	66.7	3.3	2.5
S-K	M193	465	41	8.8	18	3.9	75.0	3.5	2.3
XM16E1	M193	455	52	11.4	18	4.0	75.0	4.5	2.9
XM16E1	M196	486	63	13.0	22	4.5	91.7	5.2	3.5
H-K	M193	427	30	7.0	11	2.6	45.8	2.8	1.7
H-K	M195	533	38	7.1	18	3.4	75.0	2.9	2.1
A-R	M193	488	53	10.9	21	4.3	87.5	4.3	2.9
A-R	M195	387	27	7.0	16	4.1	66.7	2.8	1.5

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CONFIDENTIAL

RANGE (meters) 275

DAY DEFENSE - RIFLES

SECT 7-10

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AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 6

WEAPON	ammo	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M1	M30	1884	84	4.5	46	2.4	47.9	0.8	1.2
M1	M62	1922	75	3.9	41	2.1	42.7	0.7	1.0
M1	M138	1813	90	5.0	47	2.6	49.0	0.5	0.8
S-T	M133	523	20	3.8	14	2.7	58.3	1.5	1.1
S-T	M15	407	19	4.7	10	2.5	41.7	1.9	1.1
XM100	M193	471	40	8.5	17	3.6	70.8	3.3	2.2
XM100	M136	492	22	4.5	15	3.1	62.5	1.8	1.2
H-A	M193	358	14	3.9	8	2.2	53.3	1.5	0.8
H-A	M193	528	14	2.7	10	1.9	25.0	1.1	0.8
A-R	M193	445	11	2.5	7	1.6	29.2	1.0	0.6
A-R	M193	322	14	4.4	6	1.9	25.0	1.7	0.8

LEGEND:

HC - Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time/Squad

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CHART 7-11

DAY DEFENSE - RIFLES

RANGE (meters) 350

AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 6

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	2016	61	3.0	41	2.0	34.2	0.6	0.8
M14	M62	2015	45	2.2	36	1.8	30.0	0.4	0.6
M14	M198	2009	78	3.9	43	2.1	35.8	0.4	0.6
S-R	M193	592	17	2.9	8	1.4	26.6	1.1	0.9
S-R	M195	505	22	4.4	10	2.0	33.3	1.8	1.2
XM16E1	M193	489	21	4.3	9	1.8	30.0	1.7	1.2
XM16E1	M196	531	19	3.6	11	2.1	36.6	1.4	1.1
H-R	M195	398	9	2.3	8	2.0	26.6	0.9	0.5
H-R	M196	532	14	2.6	12	2.3	40.0	1.1	0.8
A-R	M193	387	9	2.3	7	1.8	23.3	0.9	0.5
A-R	M196	407	11	2.7	10	2.5	33.3	1.1	0.6

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time/Squad

CONFIDENTIAL

CONFIDENTIAL

RANGE (meters) 500

DAY DEFENSE - RIFLES

CHART 7-12

TARGET EXPOSURE TIME (sec) 6

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M30	1843	42	2.3	35	1.9	36.4	0.4	0.6
M14	M62	1892	47	2.5	33	1.7	34.4	0.5	0.7
M14	M198	1806	38	2.1	29	1.6	30.2	0.2	0.2
S-R	M193	567	16	2.8	12	2.1	50.0	1.1	0.9
S-R	M135	709	22	3.1	14	2.0	58.3	1.2	1.2
XM16E1	M193	462	6	1.3	5	1.1	54.2	0.5	0.3
XM16E1	M196	486	15	3.1	8	1.7	37.5	1.2	0.5
H-R	M193	418	10	2.4	8	1.9	29.2	0.9	0.6
H-R	M196	523	8	1.5	7	1.3	58.3	0.6	0.4
A-R	M193	457	11	2.4	9	2.0	41.7	0.9	0.6
A-R	M193	323	11	3.4	10	3.1	20.8	1.4	0.6

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-13

DAY DEFENSE - RIFLES

RANGE (meters) 600

AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 10

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	2067	55	2.7	36	1.7	37.6	0.5	0.5
M14	M62	2024	47	2.3	34	1.7	35.4	0.4	0.4
M14	M198	1883	51	2.7	32	1.7	33.4	0.3	0.2
S-R	M133	776	17	2.2	12	1.6	50.0	0.9	0.6
S-R	M135	700	21	3.0	12	1.7	50.0	1.2	0.7
XM16E1	M193	500	15	3.0	13	2.6	8.3	1.2	0.5
XM16E1	M136	527	10	1.9	9	1.7	16.7	0.8	0.3
H-R	M193	498	10	2.0	7	1.4	4.2	0.8	0.3
H-R	M195	531	17	3.2	14	2.6	20.8	1.3	0.6
A-R	M193	495	16	3.2	10	2.0	25.0	1.3	0.5
A-R	M196	451	6	1.3	5	1.1	12.5	0.5	0.2

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 800

CHART 7-14

DAY DEFENSE - RIFLES

AUTOMATIC FIRE

TARGET EXPOSURE TIME (sec) 10

WEAPON	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTR	H/PD	H/S
M14	M80	2059	25	1.2	2.	1.0	21.9	0.2	0.2
M14	M62	1920	47	2.5	34	1.8	35.4	0.5	0.4
M14	M198	2063	22	1.1	16	0.8	16.7	0.1	0.1
S-R	M193	783	15	1.9	12	1.5	50.0	0.8	0.5
S-R	M135	664	9	1.4	6	0.9	25.0	0.5	0.3
XM16E1	M193	487	2	0.4	2	0.4	8.3	0.2	0.1
XM16E1	M135	524	4	0.8	4	0.8	16.7	0.3	0.1
H-R	M193	474	3	0.6	1	0.2	4.2	0.2	0.1
H-R	M135	529	8	1.5	5	1.0	29.2	0.6	0.3
A-R	M193	510	7	1.4	6	1.2	25.0	0.5	0.2
A-R	M135	517	3	0.6	3	0.6	12.5	0.2	0.1

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-15

DAY DEFENSE - SUPPRESSIVE FIRE

RIFLES

WEAPON	TYPE AMMO	RDS FIRED 500M 600M	SEMI-AUTOMATIC FIRE									
			SECTIONS									
			1	2	3	4	5	6	7	8	9	10
M14*	M80	313.3 425.5	5.2 5.0	6.0 3.8	7.0 9.0	8.5 6.0	8.2 7.8	8.5 7.0	9.0 6.0	8.5 9.2	7.2 7.0	9.5 10.0
M14	M62	345.3 459.3	8.5 8.0	9.8 8.8	11.2 8.5	6.0 8.8	8.2 7.8	9.0 9.5	9.0 7.2	9.0 8.8	8.5 9.0	9.8 9.5
M14	M198	343.3 432.0	3.5 4.5	9.2 5.2	7.5 4.5	5.5 5.8	8.0 6.0	9.2 5.0	11.0 7.8	8.0 5.2	12.0 6.2	11.5 5.5
S-R	M193	449 649	5 8	9 12	11 15	8 8	7 14	9 10	8 4	7 12	12 11	12 17
S-R	M196	502 579	8 9	11 10	8 5	11 4	10 11	10 9	6 6	12 11	11 6	7 4
XM16E1	M193	344 458	7 2	7 0	4 1	4 9	12 7	7 9	9 8	8 6	11 3	10 6
XM16E1	M196	347 437	3 2	7 7	5 11	8 11	9 6	11 5	1 7	13 15	12 7	14 8
H-R	M193	355 448	7 8	6 7	7 4	5 6	3 9	7 7	14 12	14 4	12 9	12 11
H-R	M196	366 424	5 5	3 6	6 7	5 9	7 6	7 6	12 10	3 7	10 6	12 13
A-R	M193	402 447	2 3	11 2	7 5	4 7	15 4	15 9	13 7	11 14	16 5	14 12
A-R	M196	326 451	9 6	11 9	9 8	6 12	9 8	14 7	9 10	13 13	13 11	5 18

LEGEND: M - Meters

\* - An average of the four groups is listed for the M14.

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CHART 7-15, Day Defence - Suppressive Fire (CONTINUED)

WEAPON	TYPE AMMO	RDS FIXED 500M 600M	SEMI-AUTOMATIC FIRE										TOTAL TANET. HITS	% SECTIONS HIT	HC PANEL HITS (Z)
			SECTIONS												
			11	12	13	14	15	16							
M14	M80	313.3 425.5	11.2 11.2	6.8 12.5	10.5 6.5	12.0 7.8	8.5 10.2	10.0 11.8	136.6 130.8	100.0 100.0	43.6 30.7				
M14	M62	345.3 459.3	11.2 10.5	8.5 10.5	12.8 6.5	9.2 11.5	8.2 13.0	8.8 10.2	147.7 148.1	100.0 100.0	42.8 32.2				
M14	M198	343.3 432.0	12.2 7.8	13.5 8.2	10.5 8.2	13.2 12.0	11.0 7.5	10.0 11.5	155.8 110.9	100.0 100.0	45.4 25.7				
S-R	M193	449 649	7 13	11 8	9 16	8 9	6 8	12 9	141 174	100.0 100.0	31.4 26.8				
S-R	M196	502 579	13 6	10 6	15 7	11 6	16 4	16 6	175 110	100.0 100.0	34.9 19.0				
XM16E1	M193	344 456	12 9	12 6	17 3	9 6	9 6	11 8	149 89	100.0 93.8	43.3 19.4				
XM16E1	M196	347 437	5 5	13 15	4 9	13 17	14 9	17 9	153 144	100.0 100.0	44.1 33.0				
K-R	M193	355 448	7 11	14 12	16 13	11 7	12 15	17 21	164 156	100.0 100.0	46.2 34.8				
H-R	M196	366 424	18 8	7 10	13 6	15 10	7 10	7 10	137 129	100.0 100.0	37.4 30.4				
A-R	M193	402 447	15 9	11 14	16 10	12 16	8 16	10 13	180 146	100.0 100.0	44.8 32.7				
A-R	M195	326 451	11 4	18 9	9 10	7 6	5 9	8 4	156 144	100.0 100.0	47.9 31.9				

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CHART 7-16

DAY DEFENSE - SUPPRESSIVE FIRE

RIFLES

WEAPON	TYPE AMMO	RDS FIRED 500M 600M	AUTOMATIC FIRE									
			SECTIONS									
			1	2	3	4	5	6	7	8	9	10
M14*	M80	460.8 516.8	3.0 6.2	5.8 4.2	5.8 4.2	5.8 6.2	9.0 4.8	9.5 6.5	8.2 8.5	7.0 6.2	8.5 6.5	8.5 6.0
M14	M62	473.0 506.0	9.5 8.0	6.8 5.5	11.5 7.0	7.5 6.0	8.8 7.5	11.8 7.8	8.5 7.8	9.0 7.5	9.8 10.2	13.2 8.8
M14	M198	451.5 470.8	9.5 6.0	11.2 5.0	10.0 6.8	9.0 4.8	9.2 5.2	9.5 5.2	12.5 8.5	10.5 6.0	12.5 7.5	13.0 6.2
S-R	M193	567 776	9 9	15 8	15 7	16 8	13 8	11 8	14 8	14 15	21 7	11 9
S-R	M196	709 700	12 9	9 11	17 9	8 14	10 6	13 21	22 11	11 10	14 12	13 15
XM16E1	M193	462 500	3 3	3 8	6 4	6 4	3 6	4 5	3 5	3 9	5 3	3 1
XM16E1	M196	486 527	3 4	6 9	12 4	2 6	11 5	13 3	14 6	7 11	14 8	19 4
H-R	M193	418 498	2 7	9 5	5 8	6 3	6 5	3 10	5 11	12 7	3 13	9 9
H-R	M196	523 531	10 9	14 6	16 5	11 7	11 0	5 7	11 9	11 7	10 9	14 9
A-R	M193	457 495	5 7	4 7	5 9	6 12	13 6	9 10	4 7	7 6	10 3	4 5
A-R	M196	323 451	7 8	7 10	7 9	5 10	8 4	6 3	10 9	7 10	6 4	6 5

LEGEND: M - Meters

\* - An average of the four groups is listed for the M14.

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CHART 7-16, Day Defense - Suppressive Fire - Rifles (CONTINUED)

WEAPON	TYPE AMMO	RDS FIRED 500M 600M	AUTOMATIC FIRE						TOTAL PANEL HITS	% SECTIONS HIT	HC PANEL HITS (%)
			SECTIONS								
			11	12	13	14	15	16			
M14	M80	460.8 516.8	9.2 7.2	8.0 5.8	11.0 9.0	8.5 9.0	8.8 6.8	9.0 8.2	130.6 105.3	100.0 100.0	28.3 20.4
M14	M62	473.0 506.0	6.5 6.8	9.5 8.0	7.2 6.0	10.8 7.2	9.5 12.8	9.0 9.0	148.9 125.9	100.0 100.0	31.5 24.9
M14	M198	451.5 470.8	11.8 7.0	15.2 5.0	12.8 5.5	9.2 5.2	12.0 5.0	11.8 9.2	179.7 98.1	100.0 100.0	39.8 20.8
S-R	M193	567 776	20 12	24 11	9 10	6 4	15 5	10 9	223 138	100.0 100.0	39.3 17.8
S-R	M196	709 700	13 11	6 13	13 14	21 15	17 18	13 15	212 204	100.0 100.0	29.9 29.1
XM16E1	M193	462 500	8 5	8 5	12 6	6 3	12 5	4 9	89 81	100.0 100.0	19.3 16.2
XM16E1	M196	486 527	14 11	14 5	20 13	9 9	17 13	13 15	188 126	100.0 100.0	38.7 23.9
H-R	M193	418 498	5 5	10 3	10 4	13 5	6 16	9 14	113 125	100.0 100.0	27.0 25.1
H-R	M196	523 531	15 5	15 5	12 7	5 11	9 8	8 10	177 114	100.0 93.8	33.8 21.5
A-R	M193	457 495	4 7	5 7	10 7	6 3	10 6	11 3	113 105	100.0 100.0	24.7 21.2
A-R	M196	323 451	3 6	7 7	5 3	4 9	3 6	4 7	95 118	100.0 100.0	29.4 26.2

LEGEND: M - Meters  
HC - Hit Capability

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RANGE (meters) 100

CHART 7-17

DAY DEFENSE - CARBINES

SEMI-AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 4

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	334	33	9.9	13	3.9	54.2	1.8	2.8
M14	M62	212	31	14.6	14	6.6	58.3	2.8	2.6
M14	M138	273	55	20.1	8	2.9	33.3	3.5	4.6
SC	M123	192	41	21.4	11	5.7	45.8	8.4	3.4
SC	M126	384	51	13.3	14	3.6	56.3	5.3	4.3
C-SMG	M193	368	44	12.0	14	3.8	58.3	4.7	3.7
C-SMG	M136	402	31	7.7	12	3.0	50.0	3.1	2.4

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 200

CHART 7-18

DAY DEFENSE - CARBINES

TGT EXPOSURE TIME (sec) 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	297	37	12.4	19	6.4	79.2	2.3	2.1
M14	M62	287	21	7.3	12	4.2	50.0	1.4	1.2
M14	M198	308	56	18.2	18	5.8	75.0	3.2	3.1
SC	M193	264	33	12.5	15	5.7	62.5	4.9	1.8
SC	M196	395	39	9.9	16	4.1	66.7	4.0	2.2
C-SMG	M193	402	13	3.2	9	2.2	37.5	1.3	0.7
C-SMG	M196	432	26	6.0	14	3.2	58.3	2.4	1.4

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 275

CHART 7-19

II-27

DAY DEFENSE - CARBINES

TGT EXPOSURE TIME (sec) 6

SEMIAUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	319	7	2.2	6	1.9	25.0	0.4	0.4
M14	M62	272	18	6.6	12	4.4	50.0	1.3	1.0
M14	M138	264	25	9.5	9	3.4	37.5	1.7	1.4
SC	M133	300	25	8.3	13	4.3	54.2	3.3	1.4
SC	M136	381	16	4.2	9	2.4	37.5	1.7	0.9
C-SMG	M133	343	20	5.8	14	4.1	58.3	2.3	1.1
C-SMG	M136	444	37	8.3	15	3.4	62.5	3.4	0.1

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 350

DAY DEFENSE - CARBINES

SEMI-AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 6

CHART 7-20

II-28

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	333	4	1.2	3	0.9	12.5	0.2	0.2
M14	M62	271	8	3.0	4	1.5	16.7	0.6	0.4
M14	M198	257	6	2.3	6	2.3	25.0	0.4	0.3
SC	M193	260	11	4.2	7	2.7	29.2	1.7	0.6
SC	M136	385	7	1.8	4	1.0	16.7	0.7	0.4
C-SMG	M193	388	1	0.3	1	0.3	4.2	0.1	0.1
C-SMG	M196	377	6	1.6	4	1.1	16.7	0.6	0.3

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 500

DAY DEFENSE - CARBINES  
SEMIAUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 6

CHART 7-21

II-29

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	K/PD	H/S
M14	M80	311	12	3.9	6	1.9	25.0	0.7	0.7
M14	M62	259	3	1.2	2	0.8	8.3	0.2	0.2
M14	M138	256	1	0.4	1	0.4	4.2	0.1	0.1
SC	M133	306	13	4.2	5	1.6	20.8	1.7	0.7
SC	M136	390	1	0.3	1	0.3	4.2	0.1	0.1
C-SMG	M133	390	3	0.8	2	0.5	8.3	0.3	0.2
C-SMG	M136	389	17	4.4	8	2.1	33.3	1.8	0.9

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 600

DAY DEFENSE - CARBINES

CHART 7-22

TGT EXPOSURE TIME (sec) 10

SEMI-AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	362	10	2.8	10	2.8	41.7	0.5	0.3
M14	M62	304	8	2.6	5	1.6	20.8	0.5	0.3
M14	M138	318	10	3.1	3	0.9	12.5	0.6	0.3
SC	M133	335	3	0.9	2	0.6	8.3	0.4	0.1
SC	M136	541	20	3.7	13	2.4	54.2	1.5	0.7
C-SMG	M193	467	14	3.0	9	1.9	37.5	1.2	0.5
C-SMG	M196	441	11	2.5	9	2.0	37.5	1.0	0.4

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 800

DAY DEFENSE - CARBINES

CHART 7-23

SEMI-AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 10

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M19	M80	371	10	2.7	9	2.4	37.5	0.5	0.3
M14	M62	294	9	3.1	7	2.4	29.2	0.6	0.3
M14	M138	336	1	0.3	1	0.3	4.2	0.1	0.1
SC	M133	402	3	0.7	3	0.7	12.5	0.1	0.1
SC	M136	460	4	0.9	4	0.9	16.7	0.4	0.1
C-SMG	M133	509	4	0.8	3	0.6	12.5	0.3	0.1
C-SMG	M136	505	8	1.6	7	1.4	29.2	0.6	0.3

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 100

CHART 7-24

II-32

DAY DEFENSE - CARBINES

TGT EXPOSURE TIME (sec) 4

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	682	34	5.0	18	2.6	75.0	0.5	2.8
M14	M62	510	50	9.8	16	3.1	66.7	1.9	4.2
M14	M198	430	59	13.7	15	3.5	62.5	2.4	4.9
SC	M193	676	45	6.6	9	1.3	37.5	2.6	3.8
SC	M196	603	44	7.3	15	2.5	62.5	2.9	3.7
C-SMG	M193	685	41	6.0	12	1.8	50.0	2.4	3.4
C-SMG	M196	793	67	8.4	16	2.0	66.7	3.4	5.6

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LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

**CONFIDENTIAL**

RANGE (meters) 200

CHART 7-25  
DAY DEFENSE - CARBINES  
AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 6

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	515	35	6.8	17	3.3	70.8	1.2	1.9
M14	M62	526	35	6.6	15	2.8	62.5	1.3	1.9
M14	M138	494	67	13.6	23	4.6	95.8	2.4	3.7
SC	M133	732	34	4.6	14	1.9	58.3	1.8	1.9
SC	M136	639	47	7.4	20	3.1	83.3	3.0	2.6
C-SMG	M193	718	38	5.3	17	2.4	70.8	2.1	3.1
C-SMG	M136	768	67	8.7	21	2.7	87.5	3.5	3.7

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	711	7	1.0	5	0.7	20.8	0.2	0.4
M14	M62	520	14	2.7	8	1.5	33.3	0.5	0.8
M14	M138	495	12	2.4	8	1.6	33.3	0.4	0.7
SC	M123	693	22	3.2	13	1.9	54.2	1.3	1.2
SC	M136	631	27	4.3	10	1.6	41.7	1.7	1.5
C-SMG	M193	721	13	1.8	9	1.2	37.5	0.7	0.7
C-SMG	M136	805	15	1.9	10	1.2	41.7	0.8	0.8

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time / Squad

RANGE (Meters) 275

DAY DEFENSE - CARBINES

AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 6

CHART 7-26

II-34

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RANGE (Meters) 350

CHART 7-27

DAY DEFENSE - CARBINES

AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 6

II-35

WRN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	537	9	1.7	9	1.7	37.5	0.3	0.5
M14	M62	526	3	0.6	3	0.6	12.5	0.1	0.2
M14	M138	509	5	1.0	5	1.0	20.8	0.2	0.3
SC	M133	755	9	1.2	7	0.9	29.2	0.5	0.5
SC	M136	652	9	1.4	7	1.1	29.2	0.6	0.5
C-SMG	M193	810	11	1.4	6	0.7	25.0	0.5	0.6
C-SMG	M136	810	11	1.4	7	0.9	29.2	0.6	0.6

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 500

DAY DEFENSE - CARBINES

CHART 7-28

TGT EXPOSURE TIME (sec) 6

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	• HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M86	535	9	1.7	4	0.7	16.7	0.3	0.5
M14	M62	495	9	1.8	6	1.2	25.0	0.3	0.5
M14	M138	508	11	2.2	9	1.8	37.5	0.4	0.6
SC	M133	750	7	0.9	5	0.7	20.8	0.3	0.4
SC	M136	679	10	1.5	7	1.0	29.2	0.6	0.6
C-SMG	M193	787	4	0.5	3	0.4	12.5	0.2	0.2
C-SMG	M136	793	10	1.3	6	0.8	25.0	0.5	0.6

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 600

CHART 7-29

DAY DEFENSE - CARBINES

TGT EXPOSURE TIME (sec) 10

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M8C	540	12	2.2	7	1.3	29.2	0.4	0.4
M14	M62	511	11	2.2	10	2.0	41.7	0.4	0.4
M14	M138	525	17	3.2	12	2.3	50.0	0.6	0.6
SC	M133	724	12	1.7	8	1.1	33.3	0.7	0.4
SC	M136	677	14	2.1	9	1.3	37.5	0.8	0.5
C-SMG	M133	797	10	1.3	7	0.9	29.2	0.5	0.3
C-SMG	M136	810	16	2.0	13	1.6	54.2	0.8	0.5

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 600

CHART 7-29

DAY DEFENSE - CARBINES

AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 10

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M8C	540	12	2.2	7	1.3	29.2	0.4	0.4
M14	M62	511	11	2.2	10	2.0	41.7	0.4	0.4
M14	M138	525	17	3.2	12	2.3	50.0	0.6	0.6
SC	M133	724	12	1.7	8	1.1	33.3	0.7	0.4
SC	M136	677	14	2.1	9	1.3	37.5	0.8	0.5
C-SMG	M193	797	10	1.3	7	0.9	29.2	0.5	0.3
C-SMG	M136	810	16	2.0	13	1.6	54.2	0.8	0.5

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 800

CHART 7-30

DAY DEFENSE - CARBINES

AUTOMATIC FIRE

TGT EXPOSURE TIME (sec) 10

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14	M80	539	6	1.1	5	0.9	20.8	0.2	0.2
M14	M62	511	12	2.3	8	1.6	33.3	0.4	0.4
M14	M138	522	13	2.5	9	1.7	37.5	0.4	0.4
SC	M133	736	7	1.0	5	0.7	20.8	0.4	0.2
SC	M136	716	4	0.6	3	0.4	12.5	0.2	0.1
C-SMG	M193	743	3	0.4	3	0.4	12.5	0.2	0.1
C-SMG	M196	780	4	0.5	4	0.5	16.7	0.2	0.1

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-31

DAY DEFENSE -- SUPPRESSIVE FIRE

CARBINES

WEAPON	TYPE AMMO	RDS FIRED 500M 600M	SEMI-AUTOMATIC FIRE																TOTAL PANEL HITS	% SECT- IONS HIT	% PAN- EL HITS
			SECTIONS																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
M14	M80	311 362	3 3	10 7	10 10	6 7	10 8	7 4	9 5	8 9	7 11	16 16	6 8	8 7	13 10	9 15	9 15	139 134	91.7 95.8	44.7 37.0	
M14	M62	259 304	3 5	3 5	8 4	10 3	3 4	5 2	11 3	4 2	8 2	10 4	8 1	3 5	4 5	2 5	7 5	4 5	93 60	83.3 64.6	35.9 19.7
M14	M198	256 318	6 6	4 6	4 5	7 6	6 3	7 2	2 6	8 2	6 3	6 9	8 6	7 9	5 4	15 9	10 5	14 3	115 84	85.4 81.3	34.5 21.9
SC	M193	306 335	5 7	2 2	5 5	6 4	6 10	5 9	3 2	1 4	7 5	3 9	7 13	5 8	11 8	6 11	6 11	4 11	76 123	64.6 91.7	24.8 36.7
SC	M196	390 503	4 6	5 3	6 3	4 6	4 2	7 7	5 7	2 4	8 4	11 9	8 9	10 9	11 12	8 9	2 5	10 11	105 108	85.4 89.6	26.9 21.5
C-SMG	M193	467 389	1 2	4 8	3 6	2 3	3 1	2 6	3 2	4 1	6 1	6 2	5 1	2 3	2 4	4 5	6 5	5 3	59 46	75.0 56.3	15.1 9.9
C-SMG	M196	441	2 2	4 4	3 3	7 7	1 1	7 7	1 1	5 5	2 2	5 5	1 3	2 3	3 3	1 5	1 3	6 6	42 58	52.1 70.8	10.8 13.2

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CHART 7-32

DAY DEFENSE - SUPPRESSIVE FIRE

CARBINES

WEAPON	TYPE AMMO	RDS FIRED	AUTOMATIC FIRE																TOTAL PANEL HITS	% SECT- IONS HIT	% PAN- EL HITS
			SECTIONS																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
M14	M80	535 540 495	17 3 13	7 8 6	18 5 7	8 0 10	15 7 10	15 3 13	12 4 8	10 3 7	15 5 6	16 4 2	10 9 9	14 5 4	11 7 9	11 10 9	13 7 5	16 9 7	208 89 125	97.9 85.4 93.8	38.9 16.5 25.2
M14	M62	511 508	6 17	2 18	3 19	3 18	4 17	4 17	3 14	5 14	5 13	5 18	6 12	4 21	5 20	5 14	5 19	5 17	73 280	81.2 97.9	14.3 55.1
M14	M198	525 750	10 10	10 12	15 7	17 9	14 6	6 11	15 8	12 9	8 9	16 6	19 9	12 3	10 10	12 13	15 15	16 16	196 153	89.6 97.9	37.3 20.4
SC	M193	724 679	3 18	7 7	6 10	6 6	6 11	6 9	7 13	7 13	8 13	9 18	9 22	7 20	11 14	9 15	10 12	11 16	217 217	97.9 97.9	32.0 32.0
SC	M196	677 787	3 5	5 10	7 8	13 10	8 10	5 8	7 5	7 8	7 6	4 6	10 12	8 12	4 19	3 7	11 5	9 4	111 136	93.8 91.7	16.4 17.3
C-SMG	M193	797 793	10 13	7 9	11 11	7 5	5 7	4 5	4 13	4 9	7 13	6 12	3 6	6 15	7 8	8 14	6 11	6 12	101 163	87.5 91.7	12.7 20.6
C-SMG	M196	810	6	5	5	5	6	7	6	4	8	7	7	10	3	5	3	3	90	87.5	11.1

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CHART 7-33

II-41

DAY DEFENSE - AUTOMATIC RIFLES

RANGE (Meters) 100

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 4

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	38.4	14.0	4.4	11.5	3.0	7.8	37.5	2.1	0.5
M14E2	M62	39.0	12.4	5.2	13.3	3.2	8.2	40.0	2.5	0.7
M14E2	M198	38.0	12.8	6.4	16.8	3.8	10.0	47.5	2.9	0.8
CAR	M193	51.8	13.8	5.6	10.8	3.4	6.6	42.5	4.3	0.7
CAR	M196	51.4	15.4	6.2	12.1	3.8	7.4	47.5	4.8	0.8
S&R	M193	45.2	12.6	5.4	11.9	3.0	6.6	37.5	4.5	0.7
S&R	M195	49.6	13.6	8.8	17.7	3.6	7.3	45.0	7.3	1.1

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (Meters) 200

CHART 7-34

**DAY DEFENSE - AUTOMATIC FIRES**

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

**AUTOMATIC FIRE**

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	38.4	13.2	5.0	13.0	3.2	8.3	40.0	2.4	0.4
M14E2	M62	39.6	12.8	3.0	7.6	2.2	5.6	27.5	1.4	0.3
M14E2	M198	40.0	14.0	6.2	15.5	4.2	10.5	52.5	2.7	0.5
CAR	M193	54.0	12.4	6.4	11.9	3.2	5.9	40.0	4.6	0.5
CAR	M196	52.0	16.4	6.8	13.1	3.2	6.2	40.0	5.2	0.6
SAR	M193	55.4	15.4	5.6	10.1	3.6	6.5	45.0	4.0	0.5
SAR	M196	54.2	15.0	6.6	12.2	4.0	7.4	50.0	4.7	0.6

**LEGEND:**

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (Meters) 275

CHART 7-35

II-43

DAY DEFENSE - AUTOMATIC RIFLES

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	36.6	12.4	2.4	6.6	2.0	5.5	25.0	1.2	0.2
M14E2	M62	39.2	12.6	0.2	0.5	0.2	0.5	2.5	0.1	0.0
M14E2	M198	36.6	12.0	2.8	7.7	2.2	6.0	27.5	1.3	0.2
CAR	M193	46.8	13.6	2.8	6.0	1.8	3.8	22.5	2.3	0.2
CAR	M196	52.2	14.8	2.6	5.0	1.8	3.4	22.5	2.0	0.2
S&R	M193	55.6	14.8	2.8	5.0	2.2	4.0	27.5	2.0	0.2
S&R	M196	58.2	15.6	2.4	4.1	1.8	3.1	22.5	1.6	0.2

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHART 7-37

II-45

RANGE (meters) 350 (moving target)

DAY DEFENSE - AUTOMATIC RIFLES

(Average of Five Pairs)

TGT EXPOSURE TIME (sec) - 6

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	19.9	6.8	1.2	6.0	0.8	5.6	40.0	1.1	0.1
M14E2	M62	18.2	6.4	0.2	1.1	0.2	1.1	10.0	0.2	0.0
M14E2	M138	20.0	6.4	2.2	11.0	1.0	5.0	50.0	2.0	0.2
CAR	M193	28.2	8.4	1.8	6.4	0.6	2.1	30.0	2.6	0.2
CAR	M196	27.7	7.0	3.2	11.6	1.6	5.8	80.0	4.6	0.3
SAR	M193	28.8	8.0	1.4	4.9	0.4	1.4	20.0	2.0	0.1
SAR	M196	29.4	7.6	6.4	21.8	1.8	6.1	90.0	9.1	0.5

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 500

CHART 7-38

DAY DEFENSE - AUTOMATIC RIFLES  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	40.0	13.6	2.2	5.5	1.8	4.5	22.5	1.0	0.2
M14E2	M62	39.2	12.2	1.2	3.1	1.2	3.1	15.0	0.6	0.1
M14E2	M198	35.8	11.8	3.0	7.8	2.0	5.6	25.0	1.4	0.2
CAR	M193	54.0	14.2	1.8	3.3	1.4	2.6	17.5	1.3	0.2
CAR	M196	55.2	16.0	1.0	1.8	1.0	1.8	12.5	0.7	0.1
SAR	M193	48.4	12.2	2.8	5.8	1.8	3.7	22.5	2.3	0.2
SAR	M196	54.2	12.4	2.8	5.2	1.8	3.3	22.5	2.0	0.2

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 600

CHART 7-39

DAY DEFENSE - AUTOMATIC RIFLES

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	43.6	12.2	2.4	5.5	2.4	5.5	30.0	1.0	0.1
M14E2	M62	39.8	11.8	2.0	5.0	1.6	4.0	20.0	0.9	0.1
M14E2	M138	40.0	12.4	2.2	5.5	1.6	4.5	20.0	0.9	0.1
QAR	M193	59.2	16.0	4.0	6.8	3.4	5.7	42.5	2.7	0.2
QAR	M136	58.6	17.4	3.8	6.4	2.6	4.4	32.5	2.5	0.2
SAR	M193	54.0	12.6	3.8	7.0	3.0	5.6	37.5	2.7	0.2
SAA	M195	56.8	14.2	2.4	4.2	2.0	3.5	25.0	1.7	0.1

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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II-47



CONFIDENTIAL

RANGE (meters) 800

CHART 7-40

DAY DEFENSE - AUTOMATIC RIFLES

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	36.8	10.6	1.4	3.8	1.2	3.3	15.0	0.7	0.1
M14E2	M62	39.8	10.6	1.2	4.0	1.2	3.0	15.0	0.6	0.1
M14E2	M198	40.0	10.6	2.2	5.5	1.8	4.5	22.5	0.9	0.1
CAR	M193	56.6	14.8	0.6	1.1	0.6	1.1	7.5	0.4	0.0
CAR	M196	60.0	17.0	0.6	1.0	0.6	1.0	7.5	0.4	0.0
SAR	M193	59.4	13.0	4.0	6.7	2.2	3.7	27.5	2.7	0.2
SAR	M196	52.0	12.6	0.8	1.5	0.8	1.5	10.0	0.6	0.0

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (Meters) 800 (bunker)

CHAPT 7-41

II-49

DAY DEFENSE - AUTOMATIC RIFLES

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	ARMO	KDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	37.0	12.0	0.8	2.2	0.4	1.1	20.0	0.4	0.0
M14E2	M62	41.8	13.2	1.4	3.3	1.2	2.9	60.0	0.6	0.1
M14E2	M138	40.6	12.4	0.4	1.0	0.4	1.0	5.0	0.2	0.0
CAE	M193	62.0	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAE	M106	56.8	15.2	0.8	1.4	0.8	1.4	40.0	0.6	0.0
SAE	M193	59.0	16.2	1.2	2.0	1.0	1.7	50.0	0.8	0.1
SAE	M195	55.8	16.2	0.4	0.7	0.4	0.7	20.0	0.3	0.0

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 1,000

CHART 7-42

DAY DEFENSE - AUTOMATIC FIRES

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

(AUTOMATIC FIRE)

WPN	AMMO	KDS FIRED	TRIGGER PULLS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	38.0	12.6	1.6	4.2	1.4	3.7	14.0	0.8	0.1
M14E2	M62	40.0	13.0	1.2	3.0	1.0	2.5	10.0	0.6	0.1
M14E2	M138	39.6	13.0	0.4	3.1	0.4	1.0	4.0	0.2	0.0
CEK	M193	61.8	16.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAR	M136	59.4	16.4	0.2	0.3	0.2	0.3	2.0	0.1	0.0
S&R	M133	60.0	16.2	0.6	1.0	0.6	1.0	0.6	0.4	0.0
S&R	M196	60.0	14.6	0.8	5.5	0.8	5.5	8.0	0.5	0.0

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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CHART 7-43

RANGE (Peters) 100

DAY DEFENSE - AUTOMATIC RIFLES  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 4

SEMI-AUTOMATIC FIRE

APN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	RP	PTH	H/PPD	H/S
M-42	M80	13.6	2.8	20.5	2.0	14.7	25.0	4.0	0.4
M-42	M62	9.6	1.2	12.5	0.8	8.3	10.0	2.4	0.2
M-42	M118	12.4	3.6	29.0	2.0	16.1	25.0	5.1	0.5
QAR	M122	14.6	5.0	34.2	3.4	23.3	42.5	12.5	0.6
QAR	M136	13.8	6.0	43.5	4.4	31.9	55.0	20.0	0.8
SPR	M133								
QAR	M136								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PPD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 200

CHART 7-44

**MAY DEFENSE - AUTOMATIC RIFLES**

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

**SEMI-AUTOMATIC FIRE**

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	16.6	1.4	8.4	1.4	8.4	17.5	1.6	0.1
M14E2	M62	15.0	1.6	10.7	1.2	8.0	15.0	2.0	0.1
M14E2	M198	20.2	3.4	23.8	3.0	14.9	37.5	2.8	0.4
CAR	M193	20.6	4.4	21.4	3.0	14.6	37.5	8.8	0.4
CAR	M196	18.6	4.0	21.5	3.0	16.1	37.5	8.0	0.3
SAR	M193								
SAR	M195								

LEGEND:  
 HC - Hit Capability  
 HP - Hit Probability  
 PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
 H/S - Hits/Second of Firing Time

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CHART 7-45

RANGE (meters) 275

DAY DEFENSE - AUTOMATIC RIFLES  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M8C	14.6	1.6	11.0	1.4	9.6	17.5	2.0	0.1
M14E2	M6Z	11.2	0.8	7.1	0.8	7.1	10.0	1.3	0.1
M14E2	M198	14.6	1.6	15.1	2.0	13.7	25.0	2.0	0.2
CAR	M193	15.6	1.4	9.0	1.2	7.7	15.0	3.5	0.1
CAR	M196	15.2	2.6	17.1	1.4	9.2	17.5	6.5	0.2
SAR	M193								
SAR	M195								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 350

CHART 7-46

DAY DEFENSE - AUTOMATIC RIFLES  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	11.0	0.4	3.6	0.4	3.6	5.0	0.7	0.0
M14E2	M62	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M14E2	M198	10.9	0.2	11.0	0.2	11.0	2.5	0.3	0.0
CAR	M193	14.4	0.2	1.4	0.2	1.4	2.5	0.5	0.0
CAR	M196	10.6	0.8	7.5	0.8	7.5	10.0	2.7	0.1
S&R	M193								
S&R	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHAPT 7-47

DAY DEFENSE - AUTOMATIC RIFLES

RANGE (Meters) 350 (Moving target)  
(Average of Five Fairs)

SEMI-AUTOMATIC FIRE

APN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	11.0	4.6	41.8	1.4	12.7	70.0	7.7	0.4
M14E2	M62	9.1	2.6	28.6	1.4	15.4	70.0	5.2	0.2
M14E2	M138	10.9	1.0	9.2	0.8	7.3	40.0	1.7	0.1
CAR	M193	14.4	5.6	38.9	1.8	12.5	90.0	14.0	0.5
CAR	M196	10.6	2.6	24.5	1.2	11.3	60.0	8.7	0.2
SAR	M133								
SAR	M155								

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 500

DAY

DEFENSE - AUTOMATIC RIFLES

CHART 7-48

(Average of five Pairs)

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	13.6	0.4	2.9	0.4	2.9	5.0	0.6	0.0
M14E2	M62	14.0	1.4	10.0	1.4	10.0	17.5	2.0	0.1
M14E2	M198	14.6	0.8	5.5	0.8	5.5	17.5	1.0	0.2
CAR	M193	16.8	1.4	8.3	1.4	8.3	17.5	3.5	0.1
CAR	M196	14.4	0.6	4.2	0.6	4.2	7.5	1.5	0.1
SAR	M193								
SAR	M196								

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (Meters) 600

CHART 7-49

DAY DEFENSE - AUTOMATIC FIRE

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	26.6	3.2	12.0	2.6	9.8	32.5	2.3	0.2
M14E2	M62	19.6	1.8	9.2	1.6	8.2	20.0	1.8	0.1
M14E2	M138	21.0	3.6	20.0	3.2	15.2	40.0	3.0	0.2
CAR	M193	29.6	2.4	8.1	2.0	6.8	25.0	3.0	0.1
CAR	M196	20.6	1.6	7.8	1.4	6.8	17.5	3.2	0.1
S&R	M193								
S&R	M196								

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (meters) 800

CHART 7-50

DAY DEFENSE - AUTOMATIC RIFLES  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

SEMI-AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	25.8	2.6	10.1	2.0	7.8	25.0	1.9	0.1
M14E2	M62	20.0	1.0	5.0	1.0	5.0	12.5	0.9	0.1
M14E2	M198	20.6	1.0	5.8	0.8	3.9	10.0	0.8	0.1
CAR	M193	25.2	0.8	3.2	0.3	3.2	10.0	1.3	0.0
CAR	M196	28.8	0.4	1.4	0.2	0.7	2.5	0.6	0.0
SAR	M193								
SAR	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 800 (bunker)

CHART 7-51

DAY DEFENSE - AUTOMATIC FIRE

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	18.2	0.5	2.7	0.5	2.7	6.2	0.0	0.0
M14E2	M62	18.8	0.2	1.1	0.2	1.1	2.5	0.0	0.0
M14E2	M138	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAR	M193	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAR	M196	20.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S&R	M133								
S&R	M155								

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (Meters) 1000

DAY DEFENSE - AUTOMATIC RIFLE

CHART 7-52

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	17.6	0.8	4.5	0.8	4.5	8.0	0.0	0.0
M14E2	M62	19.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M14E2	M198	17.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAR	M193	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAR	M196	18.4	0.4	2.2	0.2	1.1	2.0	0.0	0.0
SPR	M193								
SPR	M196								

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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DAY DEFENSE - SUPPRESSIVE FIRE  
(Total of Five Pairs Unless Otherwise Noted)  
AUTOMATIC RIFLES

WEAPON	TYPE AMMO	RDS FIRED	AUTOMATIC FIRE																TOTAL PANEL HITS	% SECTIONS HIT (AV PER PAIR)	HC (PAN- EL HITS)			
			SECTIONS																					
			500M 600M 200	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				16		
M14E2	M80	218	4	4	0	4	1	3	3	4	17	10	6	10	10	15	7	3	6	9	132	16.6	67.3	
M14E2	M62	199	4	8	6	3	3	6	3	4	9	13	4	7	5	8	4	8	7	15	18	128	14.1	71.5
M14E2	M198	179	5	14	6	1	4	4	9	13	4	6	3	7	7	13	8	6	7	6	4	73	10.2	36.5
M14E2	M198	200	0	6	3	4	3	5	5	4	6	9	7	3	6	13	8	10	16	10	9	126	16.4	46.7
CAR	M193	270	6	2	3	2	8	7	10	9	5	10	4	3	6	7	5	4	5	5	76	10.6	25.7	
CAR	M193	296	3	4	3	6	5	5	1	5	5	10	4	3	6	7	3	7	8	13	19	133	16.4	48.2
CAR	M193	275	7	4	4	4	5	4	5	7	13	3	8	8	8	15	7	3	7	19	87	12.5	29.7	
-CAR	M196	293	4	6	5	6	4	4	7	8	7	1	6	6	7	3	3	8	5	7	90	10.8	37.2	
SAR	M193	242	0	4	2	6	2	6	2	5	0	5	3	8	9	2	8	10	11	15	95	13.3	35.2	
SAR	M193	270	4	1	6	0	5	5	13	12	2	2	6	5	7	7	4	9	7	7	155	18.1	57.2	
SAR	M196	271	5	2	2	3	3	5	8	6	7	8	9	11	9	11	16	14	27	16	117	16.4	41.2	
SAR	M196	284	10	5	5	5	8	6	2	9	6	6	6	10	10	6	9	11	11	8	117	16.4	41.2	

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LEGEND: M - Meters  
HC - Hit Capability

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LEGEND: M - Meters  
HC - Hit Capability

WEAPON	TYPE AMMO	RDS FIRED 500M 600M	SEMI-AUTOMATIC FIRE																TOTAL PANEL HITS	% SECT- IONS HIT (AVE PER PAIR)	HC (PAN- EL HITS)
			SECTIONS																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
M14E2	M80	68 133	4 2	1 4	0 3	4 3	1 2	1 8	3 7	2 3	3 4	3 4	6 4	4 4	3 4	3 9	9 6	3 2	50 71	7.0 10.0	73.5 53.4
M14E2	M62	70 98	2 2	0 4	1 2	1 1	6 4	2 5	3 4	2 0	7 5	2 7	2 3	4 4	3 8	2 4	3 4	3 3	43 60	6.6 8.4	61.4 61.2
M14E2	M198	73 105	7 1	6 1	2 3	3 3	2 1	3 5	4 6	3 2	2 5	4 6	5 8	6 6	6 9	5 5	6 11	8 8	72 80	10.2 11.7	98.6 76.2
CAR	M193	84 148	4 3	0 1	1 2	1 9	5 1	4 1	8 5	3 10	5 0	2 1	7 2	11 2	2 0	2 8	5 16	6 5	66 66	10.2 8.3	78.6 44.6
CAR	M196	72 103	4 0	1 1	0 2	2 5	3 3	1 0	3 3	3 4	5 2	2 4	3 6	5 6	5 5	4 6	8 8	3 6	52 61	7.2 8.9	72.2 59.2

DAY DEFENSE - SUPPRESSIVE FIRE  
(Total of Five Pairs Unless Otherwise Noted)

AUTOMATIC RIFLES

CHART 7-54

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RANGE (Meters) 100

CHART 7-55

DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 4

AUTOMATIC FIRE

APN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	156	24	35.3	7	4.5	87.5	2.9	6.0
M14E2	M62	180	26	14.4	7	3.9	87.5	2.7	6.5
M14E2	M138	142	42	29.6	6	4.2	75.0	5.2	10.5
CAK	M193	266	59	22.2	8	3.0	100.0	8.7	14.8
CAK	M196	237	53	22.4	7	3.0	87.5	9.0	13.3
S&R	M133	232	50	21.6	7	3.0	87.5	8.5	12.5
CAK	M156	159	62	39.0	8	5.0	100.0	15.5	15.5

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 200

DAY DEFENSE - AUTOMATIC RIFLES

CHART 7-56

Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	169	11	6.5	5	3.0	62.5	1.2	1.8
M14E2	M62	180	16	8.9	5	2.8	62.5	1.7	2.7
M14E2	M198	177	28	15.8	7	4.0	87.5	2.8	4.7
CAR	M193	251	44	17.5	8	3.2	100.0	6.9	7.3
CAR	M196	256	31	12.1	6	2.3	75.0	4.8	5.2
SAR	M193	258	33	12.8	8	3.1	75.0	5.0	5.5
SAR	M196	182	53	29.1	8	4.4	75.0	9.5	8.8

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Peters) 275

CHART 7-57

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

APN	ARMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M4E2	M80	174	18	10.3	4	2.3	50.0	1.9	3.0
M4E2	M62	178	7	3.9	6	3.4	75.0	0.7	1.2
M4E2	M138	174	19	10.9	7	4.0	87.5	1.9	3.2
CAR	M193	239	18	7.5	6	2.5	75.0	3.0	3.0
CAR	M196	259	10	3.9	4	1.5	50.0	1.5	1.7
S&R	M193	248	10	4.0	5	2.0	62.5	1.6	1.7
CAR	M195	179	20	11.2	8	4.5	100.0	4.4	3.3

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 350

CHART 7-58

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 5

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	87	6	6.9	2	2.3	25.0	1.3	1.0
M14E2	M62	90	2	2.2	1	1.1	12.5	0.4	0.3
M14E2	M198	90	3	3.3	3	3.3	37.5	0.6	0.5
CAR	M193	133	2	1.5	1	0.8	12.5	0.6	0.3
CAR	M196	127	4	3.2	3	2.4	37.5	1.2	0.7
SAR	M193	133	7	5.3	3	2.3	37.5	2.1	1.2
SAR	M196	88	4	4.5	2	2.3	25.0	1.8	0.7

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time/Squad

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CHART 7-59

RANGE (Meters) 350 (Moving target) DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	88	10	11.4	2	2.3	100.0	2.1	1.7
M14E2	M62	90	1	1.1	1	1.1	50.0	0.2	0.2
M14E2	M138	89	16	18.0	2	2.2	100.0	3.1	2.7
CAR	M193	132	7	5.3	2	1.5	100.0	2.1	1.2
CAR	M136	126	18	14.3	2	1.6	100.0	5.6	3.0
SAR	M133	132	7	5.3	2	1.5	100.0	2.1	1.2
SAR	M195	87	5	5.8	2	2.3	100.0	2.3	0.8

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 500

CHART 7-60

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	145	1	0.7	1	0.7	12.5	0.1	0.2
M14E2	M62	180	8	4.4	6	3.3	75.0	0.8	1.3
M14E2	M158	179	18	10.1	7	3.9	87.5	1.8	3.0
CAR	M193	258	9	3.5	6	2.3	75.0	1.2	1.5
CAR	M196	258	13	5.0	4	1.6	50.0	2.0	2.2
SAR	M193	256	9	3.5	5	2.0	62.5	1.4	1.5
SAR	M196	179	16	8.9	6	3.4	75.0	3.6	2.7

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 600

CHART 7-61

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

APN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	177	5	2.8	4	2.3	50.0	0.5	0.5
M14E2	M62	180	11	6.1	7	3.9	87.5	1.2	1.1
M14E2	M138	173	14	8.1	6	3.5	75.0	1.4	1.4
CAF	M192	266	8	3.0	4	1.5	50.0	1.2	0.8
CAF	M136	265	6	2.3	5	1.9	62.5	0.9	0.6
SAR	M133	268	7	2.6	4	1.5	50.0	1.0	0.7
CAF	M195	188	18	9.6	5	2.7	62.5	3.8	1.8

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time / Squad

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RANGE (Meters) 800

CHART 7-62

DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	161	5	3.1	4	2.5	50.0	0.6	0.5
M14E2	M62	177	8	4.5	4	2.3	50.0	0.9	0.8
M14E2	M138	176	1	0.6	1	0.6	12.5	0.1	0.1
CAK	M193	265	5	1.9	2	0.8	25.0	0.7	0.5
CAK	M196	240	2	0.8	2	0.8	25.0	0.3	2.0
SAR	M193	254	7	2.8	3	1.2	37.5	1.1	0.7
SAR	M196	178	5	2.8	3	1.7	37.5	1.1	0.5

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 100

CHART 7-63

DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 4

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SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	92	22	23.9	8	8.7	100.0	4.4	5.5
M14E2	M62	103	31	30.1	6	5.8	75.0	5.7	7.8
M14E2	M198	90	33	36.7	6	6.7	75.0	6.5	8.3
CAR	M193	124	29	23.4	6	4.8	75.0	9.1	7.3
CAR	M196	122	51	41.8	7	5.7	87.5	17.0	12.8
S&R	M193								
S&R	M196								

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 200

CHART 7-64

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	122	21	17.2	8	6.6	100.0	3.2	3.5
M14E2	M62	105	28	26.7	7	6.7	87.5	5.1	4.7
M14E2	M138	93	24	25.8	7	7.5	87.5	4.5	4.0
CAR	M193	135	7	5.2	3	2.2	37.5	2.0	1.2
CAR	M136	144	32	22.2	7	4.9	87.5	8.9	5.3
SAR	M193								
SAR	M196								

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-65

RANGE (meters) 275

DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

JPN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	105	5	4.8	3	2.9	37.5	0.9	0.8
M14E2	M62	88	5	5.7	5	5.7	62.5	1.1	0.8
M14E2	M138	87	13	14.9	8	9.2	100.0	2.6	2.2
CAR	M193	128	15	11.7	8	6.2	100.0	4.5	2.5
CAR	M136	129	22	17.1	6	4.7	75.0	6.9	3.7
SAR	M133								
CAR	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 350

CHART 7-66

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	69	3	4.3	1	1.4	12.5	0.8	0.5
M14E2	M62	55	4	7.3	3	5.5	37.5	2.9	0.7
M14E2	M198	40	5	12.5	2	5.0	25.0	2.2	0.8
CAR	M193	84	6	7.1	3	3.6	37.5	2.7	1.0
CAR	M196	71	15	21.1	4	5.6	50.0	8.3	2.5
SAR	M193								
SAR	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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CHART 7-67

RANGE (Meters) 350 (Moving target) DAY DEFENSE - AUTOMATIC FIRES  
Squad Exercise

SEMI-AUTOMATIC FIRE

WPN	ARMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M20	70	9	12.9	2	2.9	100.0	2.4	1.5
M14E2	M62	54	5	9.3	2	3.7	100.0	1.8	0.8
M14E2	M198	41	6	14.6	2	4.9	100.0	2.6	1.0
CAR	M193	84	7	8.3	2	2.4	100.0	3.2	1.2
CAR	M196	70	14	20.0	2	2.9	100.0	7.8	2.3
SAR	M193								
SAR	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 500

CHART 7-68  
DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 6

SEMI-AUTOMATIC FIRE

APN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M14E2	M80	104	2	2.0	2	2.0	25.0	0.4	0.3
M14E2	M62	94	9	9.6	4	4.3	50.0	1.8	1.5
M14E2	M193	80	9	11.3	6	7.5	75.0	2.0	1.5
CAR	M193	119	8	6.7	7	5.9	87.5	2.6	1.3
CAR	M196	128	10	7.8	4	3.1	50.0	3.1	1.7
SAR	M193								
SAR	M196								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 600

CHART 7-69

DAY DEFENSE - AUTOMATIC RIFLES

Squad Exercise

TGT EXPOSURE TIME (Sec) - 10

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SEMI-AUTOMATIC FIRE

APN	AMMO	RDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M+E2	M8C	153	5	3.3	3	2.0	37.5	0.6	0.5
M+E2	M62	139	10	7.2	5	3.6	62.5	1.4	1.0
M+E2	M138	148	10	6.8	5	3.4	62.5	1.2	1.0
JAR	M193	165	11	6.7	5	3.0	62.5	2.6	1.1
CAR	M196	192	19	9.9	4	2.1	50.0	4.0	1.9
SAR	M133								
BAR	M195								

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (Meters) 800

CHAPT 7-70

DAY DEFENSE - AUTOMATIC RIFLES  
Squad Exercise

TGT EXPOSURE TIME (Sec) - 10

SEMI-AUTOMATIC FIRE

APN	AMMO	KDS FIRED	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M192	M80	134	14	10.4	6	4.5	75.0	1.9	1.4
M192	M62	139	10	7.2	6	4.3	75.0	1.4	1.0
M192	M138	135	3	2.2	1	0.7	12.5	0.4	0.3
M192	M192	143	3	2.1	3	2.1	37.5	0.8	0.3
M192	M196	184	2	1.1	2	1.1	50.0	0.4	0.2
M192	M133								
M192	M135								

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time/Squad

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RANGE (meters) 100

CHART 7-71

DAY DEFENSE - MACHINE GUNS

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 4

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGT HIT	HP	PTH	H/PD	H/S
M5C-LMG	4-1	50.2	9.8	4.0	8.0	1.8	3.6	22.5	1.3	0.5
M5C-LMG	4D-1	44.2	8.0	11.8	25.8	4.6	10.4	57.5	3.9	1.4
M60-MMG	4-1	44.2	8.2	5.6	12.7	3.6	8.1	45.0	2.0	0.7
M60-MMG	4D-1	45.0	8.6	9.8	25.3	3.8	8.4	47.5	3.8	1.4
SLMG	4-1	41.8	7.6	5.6	13.4	3.0	7.2	37.5	4.4	0.7
SMG	4-1	40.2	7.4	4.6	11.4	2.6	6.5	32.5	3.8	0.6

LEGEND:

HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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RANGE (meters) 200

DAY DEFENSE - MACHINE GUNS

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

AUTOMATIC FIRE

CHART 7-72

02-11

PN	AMMO	RDS FIRED	TRIGGER PULLS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M30-LMG	4-1	62.3	12.0	7.4	11.9	3.8	6.1	47.5	1.9	0.6
M30-LMG	4D-1	66.4	13.6	18.2	28.0	5.4	8.1	67.5	4.2	1.5
M50-MMG	4-1	63.2	12.0	6.6	10.4	4.0	6.3	50.0	1.7	0.6
M50-MMG	4D-1	57.4	11.8	10.2	17.8	4.6	8.0	57.5	2.7	0.9
SLMG	4-1	43.8	11.0	5.2	11.9	2.8	6.4	35.0	3.9	0.4
SYMG	4-1	51.6	10.0	7.4	14.3	3.6	7.0	45.0	4.7	0.6

LEGEND: HC - Hit Capability

HP - Hit Probability

PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition

H/S - Hits/Second of Firing Time

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CHART 7-73

18-81

DAY DEFENSE - MACHINE GUNS

RANGE (meters) 275

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M60-IMG	4-1	52.4	9.6	2.0	3.8	1.8	3.4	22.5	0.6	0.2
M60-IMG	4D-1	58.0	12.2	6.4	9.3	3.2	5.5	40.0	1.4	0.5
M60-MMG	4-1	55.0	10.8	1.6	2.9	1.0	1.8	12.5	0.5	0.1
M60-MMG	4D-1	42.4	10.4	4.4	10.4	1.6	3.8	20.0	1.6	0.4
SLMG	4-1	42.4	8.0	1.6	3.8	1.4	3.3	17.5	1.2	0.1
SNMG	4-1	34.2	6.8	1.6	4.7	1.0	2.9	12.5	1.6	0.1

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M3C-LMG	4-1	31.9	5.2	1.8	5.6	1.2	3.8	15.0	0.9	0.2
M3C-LMG	4D-1	40.6	6.6	1.8	4.4	1.4	3.4	17.5	2.5	0.2
M50-XMG	4-1	30.6	5.4	0.2	0.7	0.2	0.7	2.5	0.1	0.0
M50-XMG	4D-1	30.6	5.8	1.6	5.9	1.0	3.3	12.5	0.9	0.2
SLMG	4-1	32.1	5.4	0.4	1.2	0.4	1.2	5.0	0.4	0.0
SNMG	4-1	21.5	2.6	0.4	1.9	0.4	1.9	5.0	0.6	0.0

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

RANGE (meters) 350 ("E" Tgts)

DAY DEFENSE - MACHINE GUNS  
(Average of Five Pairs)

AUTOMATIC FIRE

TGT EXPOSURE TIME (Sec) - 6

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CHART 7-7,

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RANGE (meters) 350 (Moving Tgts)

DAY DEFENSE - MACHINE GUNS  
(Average of Five Pairs)

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M60-LMG	4-1	31.9	7.4	4.8	15.0	1.6	5.0	80.0	2.4	0.4
M60-LMG	4D-1	40.6	8.4	8.2	20.2	1.8	4.4	90.0	3.0	0.7
M60-MMG	4-1	30.6	6.4	2.8	9.2	1.8	5.9	90.0	1.5	0.2
M60-MMG	4D-1	30.6	5.8	3.0	10.5	1.0	3.3	50.0	1.7	0.3
SLMG	4-1	32.1	5.8	4.0	12.5	1.0	3.1	50.0	4.0	0.3
SMG	4-1	21.5	5.6	1.8	8.4	1.2	5.6	60.0	2.6	0.2

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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RANGE (meters) 500

DAY DEFENSE - MACHINE GUNS  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 6

CHART 7-76

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WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M30-LMG	4-1	55.2	10.6	2.0	3.6	1.8	3.3	22.5	0.6	0.2
M30-LMG	4D-1	68.8	13.4	2.2	3.2	2.2	3.2	27.5	0.5	0.2
M30-MMG	4-1	56.6	11.2	3.2	5.7	1.8	3.2	22.5	0.9	0.3
M30-MMG	4D-1	50.2	10.0	3.0	6.0	2.0	4.0	25.0	0.9	0.2
SLMG	4-1	49.4	10.0	3.2	6.5	2.8	5.7	35.0	2.1	0.3
SMG	4-1	40.8	13.0	1.4	3.4	1.4	3.4	17.5	1.2	0.1

LEGEND:  
HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHART 7-77

II-85

RANGE (meters) 600

DAY DEFENSE - MACHINE GUNS  
(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M60-IMG	4-1	110.8	15.8	4.8	4.3	2.4	2.2	30.0	0.7	0.2
M6C-IMG	4D-1	119.4	18.0	4.2	3.5	3.2	2.7	40.0	0.5	0.2
M60-MMG	4-1	95.0	15.8	2.6	2.7	1.8	1.5	22.5	0.4	0.1
M60-MMG	4D-1	97.2	15.0	2.6	2.7	2.0	2.1	25.0	0.4	0.1
SLMG	4-1	91.2	13.0	3.4	3.7	2.6	2.9	32.5	1.2	0.2
SMG	4-1	85.4	14.4	2.6	3.0	1.8	2.1	22.5	1.0	0.1

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHART 7-78

DAY DEFENSE - MACHINE GUNS

RANGE (meters) 800 ("E" Tgts)

(Average of five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULLS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M50-LMG	4-1	107.6	14.8	3.4	3.2	2.4	2.2	30.0	0.5	0.2
M50-LMG	4D-1	104.4	15.6	2.0	1.9	1.6	1.5	20.0	0.3	0.1
M50-HEMG	4-1	100.8	15.2	3.4	3.4	2.4	2.4	30.0	0.5	0.2
M50-HEMG	4D-1	94.6	15.4	0.2	0.2	0.2	0.2	2.5	0.0	0.0
SLMG	4-1	56.4	11.8	1.0	1.8	1.0	1.8	12.5	0.6	0.1
SMG	4-1	68.4	10.6	2.8	4.1	2.6	3.8	32.5	1.3	0.1

LEGEND: HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHART 7-79

II-87

DAY DEFENSE - MACHINE GUNS

RANGE (meters) 800 (Bunker)

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULLS	TGT HITS	HC	TGTS HIT	HP	PTH	H/PD	H/S
M50-LMG	4-1	103.0	17.6	3.2	3.1	0.8	0.8	40.0	0.5	0.2
M50-LMG	4D-1	120.8	19.8	0.2	0.2	0.2	0.2	10.0	0.0	0.0
M60-MMG	4-1	139.8	20.0	1.8	1.3	1.0	0.7	50.0	0.2	0.1
M60-MMG	4D-1	122.4	17.2	0.4	0.2	0.4	0.2	10.0	0.0	0.0
SLMG	4-1	97.6	15.0	0.6	0.6	0.5	0.6	30.0	0.2	0.0
SMG	4-1	114.6	17.2	0.6	0.5	0.4	0.3	20.0	0.2	0.0

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of Ammunition  
H/S - Hits/Second of Firing Time

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CHART 7-80

DAY DEFENSE - MACHINE GUNS

RANGE (meters) 1000

(Average of Five Pairs)

TGT EXPOSURE TIME (Sec) - 10

AUTOMATIC FIRE

WPN	AMMO	RDS FIRED	TRIGGER PULS	TCL HITS	HC	TGTS HITS	HP	PTH	H/PD	H/S
M30-IMG	4-1	104.4	19.0	3.8	3.6	3.2	3.1	32.0	0.6	0.2
M30-IMG	4D-1	106.4	17.2	1.4	1.3	1.0	1.1	12.0	0.2	0.1
M60-MMG	4-1	125.8	21.6	3.0	2.4	2.6	2.1	26.0	0.4	0.2
M60-MMG	4D-1	121.0	18.6	1.6	1.3	1.6	1.2	14.0	0.2	0.1
SLMG	4-1	106.0	15.0	0.6	0.6	0.6	0.6	6.0	0.2	0.0
SPMG	4-1	98.4	14.6	0.4	0.4	0.2	0.2	2.0	0.1	0.0

LEGEND:

HC - Hit Capability  
HP - Hit Probability  
PTH - Percent of Targets Hit

H/PD - Hits/Pound of ammunition  
H/S - Hits/Second of Firing Time

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## NIGHT DEFENSE - PREDETERMINED FIRE - MACHINE GUNS

(Average of Five Pairs)

RANGE: 200 METERS

WEAPON	AMMO (100 rds)	AVE TIME TO FIRE (Seconds)	AVE TIME TO SHIFT	TRIGGER PULLS	(1) TGT HTS	(2) TGLS HIT	(3) PANEL HTS	HC	H/PD	H/S	% OF 16 TGLS HIT
M60-MMG	4-1	155.8	76.6	17.2	16.2	5.8		16.2	2.6	.10	36.3
	T	41.4	40.8	16.8	16.2	5.0		16.2	2.6	.39	31.3
	4D-1	39.4	36.2	17.6	21.0	5.4		21.0	3.1	.53	33.8
SMMG	4-1	89.8	52.2	16.6	6.4	3.4		6.4	2.1	.07	21.3
	T	98.4	45.8	16.6	9.4	3.6		9.4	3.2	.10	22.5

RANGE: 275 METERS

M60-MMG	4-1	87.6	68.0	17.2	1.2	1.0		1.2	.2	.01	6.3
	T	57.2	51.2	19.2	2.6	2.0		2.6	.4	.05	12.5
	4D-1	41.6	38.4	18.0	3.2	2.0		3.2	.5	.08	12.5
SMMG	4-1	99.8	65.8	17.4	3.0	1.6		3.0	1.0	.03	10.0
	T	71.8	46.0	17.4	1.8	1.4		1.8	.6	.03	8.8

RANGE: 500 METERS

M60-MMG	4-1	85.4	61.0	17.0	5.6	3.4	63.8	5.6	.9	.07	21.3
	T	56.8	49.4	15.6	2.4	2.2	47.2	2.4	.4	.04	13.8
	4D-1	36.0	43.2	17.2	4.6	3.0	81.0	4.6	.7	.13	18.8
SMMG	4-1	86.8	60.2	16.8	7.0	3.8	57.4	7.0	2.3	.08	23.8
	T	54.6	51.8	16.4	3.8	2.6	67.8	3.8	1.3	.07	16.3

RANGE: 600 METERS

M60-MMG	4-1	102.4	-----	17.4	4.6	3.0	41.0	4.6	.7	.04	18.8
	T	57.0	-----	16.4	2.8	1.8	28.4	2.8	.4	.05	11.3
	4D-1	39.4	-----	16.6	3.4	2.8	31.8	3.4	.5	.09	17.5
SMMG	4-1	113.8	-----	16.8	4.0	2.4	29.2	4.0	1.3	.04	15.0
	T	52.8	-----	16.6	3.2	2.6	31.0	3.2	1.1	.06	16.3

(1) - Same as HC (2) - Same as HP (3) - 500 and 600 meters only

NOTE: 50 rounds per target array per firer.

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CHART 7-82

NIGHT DEFENSE - ILLUMINATED FIRE - MACHINE GUNS

(Average of Five Pairs)

RANGE: 200 METERS

WEAPON	AMMO (100 rds)	AVG TIME TO FIRE (Seconds)	TRIGGER PULLS	(1) TGT HITS	(2) TGT HITS	(3) PANEL HITS	HC	H/PD	H/S	% OF 16 TGT HIT
M60-IMG	4-1	28.0	18.8	10.6	3.8	--	3.8	1.7	.38	23.8
M60-MMG	4-1	32.4	16.6	10.4	5.0	--	5.0	1.7	.32	31.3
SIMG	4-1	63.4	20.0	10.6	4.6	--	4.6	3.5	.17	28.8
SMG	4-1	61.6	18.4	6.2	3.4	--	3.4	2.1	.10	21.3

RANGE: 275 METERS

M60-IMG	4-1	28.4	17.4	5.2	3.0	--	3.0	.8	.18	18.8
M60-MMG	4-1	35.2	16.2	2.6	1.4	--	1.4	.4	.07	8.8
SIMG	4-1	41.8	20.2	3.0	2.4	--	2.4	1.0	.07	15.0
SMG	4-1	75.0	18.8	2.0	1.0	--	1.0	.7	.03	6.3

RANGE: 500 METERS

M60-IMG	4-1	30.0	17.0	1.4	1.4	51.0	1.4	.2	.05	8.8
M60-MMG	4-1	32.4	16.6	2.2	1.8	38.6	2.2	.4	.07	11.3
SIMG	4-1	68.8	18.8	1.6	1.4	29.4	1.6	.5	.02	8.8
SMG	4-1	47.8	17.8	1.0	1.0	27.8	1.0	.3	.02	6.3

RANGE: 600 METERS

M60-IMG	4-1	30.0	18.4	3.6	2.6	25.0	3.6	.6	.12	16.3
M60-MMG	4-1	43.2	19.4	2.2	2.0	22.0	2.2	.4	.05	12.5
SIMG	4-1	59.4	19.2	1.6	1.4	16.4	1.6	.5	.03	8.8
SMG	4-1	37.0	16.4	1.8	1.8	18.0	1.8	.6	.05	11.3

- (1) - Same as HC      (2) - Same as HP      (3) - 500 and 600 meters only

NOTE: 50 rounds per target array per firer.

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CHART 7-83

DAY DEFENSE - SUPPRESSIVE FIRE

MACHINE GUNS

(Total of Five Pairs Unless Otherwise Noted)

WEAPON	TYPE	RDS FIRED	AUTOMATIC FIRE																TOTAL PANEL HITS	% SEC- TIONS HIT (AV PER PAIR	HC PANEL HITS
			SECTIONS																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
M60-IMG	4M80: 1M62	276 554	3	4	6	3	6	7	8	15	10	9	8	9	15	10	9	10	132	14.7	47.8
M60-IMG	4M198: 1M62	344 597	1	3	4	11	12	11	9	9	15	13	9	14	21	26	18	9	185	20.3	53.8
M60-IMG	4M80: 1M62	283 475	5	11	7	8	13	15	8	11	11	15	10	10	3	9	11	11	158	19.5	26.5
M60-IMG	4M198: 1M62	251 486	6	3	4	5	6	9	12	11	16	18	18	12	16	11	19	12	178	20.6	70.9
M60-IMG	4M198: 1M196	247 456	7	4	7	2	11	6	11	4	12	8	11	11	20	13	20	11	158	18.3	64.0
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7	3	0	2	14	5	11	5	10	13	8	11	103	12.8	50.5
SIMG	4M193: 1M196	204 427	4	6	8	7	10	9	8	5	5	6	4	4	5	4	6	5	103	13.3	22.6
SIMG	4M193: 1M196	204 427	4	3	5	2	7														

## POINTED FIRE ACCURACY - RIFLES

(SEMI-AUTOMATIC)

40 METERS

WEAPON	P O I N T E D							A I M E D						
	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	Rds Sec	Rds Fired	Tgt Hits	HC	Hit	PTH	T	Rds Sec
M14	5.4	0.7	13.0	0.5	50.0	1.7	1.8	3.1	1.0	32.3	0.6	60.0	2.1	1.0
S-R	5.0	0.7	14.0	0.5	50.0	1.7	1.7	4.2	1.3	31.0	0.8	80.0	2.1	1.4
XM16E1	4.3	0.4	9.3	0.4	40.0	1.7	1.4	3.0	0.8	26.7	0.6	60.0	2.0	1.0
H-R	6.2	0.7	11.3	0.5	50.0	1.6	2.1	3.8	1.2	31.6	0.7	70.0	1.8	1.3
A-R	5.4	0.6	11.1	0.4	40.0	2.0	1.8	2.7	1.1	40.8	0.6	60.0	2.3	0.9

80 METERS

M14	6.1	0.3	4.9	0.3	30.0	1.7	1.7	3.0	0.5	16.7	0.4	40.0	2.3	0.8
S-R	6.6	0.4	6.1	0.3	30.0	1.6	1.9	3.7	0.5	13.5	0.4	40.0	2.4	1.1
XM16E1	6.1	0.2	3.3	0.2	20.0	1.7	1.7	3.4	0.6	17.6	0.5	50.0	2.4	1.0
H-R	6.4	0.3	4.7	0.3	30.0	1.7	1.8	3.8	0.6	15.8	0.5	50.0	1.8	1.1
A-R	6.0	0.4	6.7	0.4	40.0	2.1	1.7	2.8	0.5	17.9	0.4	40.0	2.6	0.8

150 METERS

M14	6.4	0.2	3.1	0.2	20.0	2.0	1.6	3.1	0.4	12.9	0.3	30.0	2.5	0.8
S-R	7.9	0.2	2.5	0.2	20.0	2.0	2.0	4.4	0.5	11.4	0.5	50.0	2.6	1.1
XM16E1	5.8	0.1	1.7	0.1	10.0	2.3	1.4	3.1	0.2	6.5	0.2	20.0	2.6	0.8
H-R	1.0	0.3	4.3	0.2	20.0	1.8	1.8	4.0	0.3	7.5	0.2	20.0	2.0	1.0
A-R	5.7	0.3	5.3	0.2	20.0	2.5	1.4	2.9	0.4	13.8	0.3	30.0	2.8	0.7

LEGEND: T - Time to Engage Target

HC - Hit Capability

PTH - Percent of Targets Hit

Rds/Sec - Rounds per Second of Time

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POINTED FIRE ACCURACY - RIFLES  
(AUTOMATIC)

II-93

## 40 METERS

WEAPON	P O I N T E D										A I M E D									
	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP		
M14	8.8	0.9	10.2	0.6	60.0	1.6	.3	2.9	3.4	6.9	0.8	11.6	0.6	60.0	1.8	.3	2.3	2.7		
S-R	11.1	0.8	7.2	0.7	70.0	1.7	.2	3.7	3.8	8.2	0.9	11.0	0.6	60.0	1.9	.4	2.7	2.6		
XM16E1	9.4	0.8	8.5	0.6	60.0	1.6	.2	3.1	3.4	7.5	1.1	14.7	0.6	60.0	2.0	.4	2.5	2.6		
H-R	6.3	0.9	14.3	0.5	50.0	1.8	.4	2.1	2.5	7.5	1.1	14.7	0.6	60.0	1.9	.3	2.5	3.2		
A-R	8.1	1.0	12.3	0.6	60.0	1.8	.4	2.7	2.8	6.7	1.0	14.9	0.5	50.0	2.0	.4	2.2	2.5		

## 80 METERS

M14	8.3	0.5	6.0	0.4	40.0	1.8	.1	2.4	3.5	6.8	0.5	7.4	0.4	40.0	2.0	.2	1.9	2.7
S-R	10.9	0.4	3.7	0.4	40.0	1.9	.1	3.1	3.7	8.1	0.4	4.9	0.3	30.0	2.2	.2	2.3	2.7
XM16E1	9.4	0.3	3.2	0.3	30.0	1.8	.1	2.7	3.4	7.6	0.4	5.3	0.4	40.0	2.0	.1	2.2	2.8
H-R	9.5	0.2	2.1	0.2	20.0	1.9	.1	2.7	3.9	7.9	0.4	5.1	0.4	40.0	2.1	.1	2.2	3.2
A-R	8.6	0.5	5.8	0.4	40.0	1.9	.2	2.4	3.0	6.9	0.4	5.8	0.3	30.0	2.2	.2	2.0	2.5

## 150 METERS

M14	9.0	0.4	4.4	0.3	30.0	1.9	.1	2.2	3.7	7.3	0.3	4.1	0.2	20.0	2.2	.1	1.8	2.9
S-R	12.1	0.3	2.5	0.2	10.0	1.9	.1	3.0	4.2	8.7	0.3	3.4	0.3	30.0	2.4	.1	2.2	2.8
XM16E1	10.4	0.1	1.0	0.1	10.0	1.8	.0	2.6	3.7	8.4	0.3	3.6	0.3	30.0	2.3	.1	2.1	2.9
H-R	11.0	0.2	1.8	0.2	20.0	2.0	.1	2.8	4.4	8.4	0.2	2.4	0.2	20.0	2.1	.1	2.1	3.5
A-R	9.0	0.1	1.1	0.1	10.0	1.9	.1	2.4	3.4	7.4	0.2	2.7	0.2	20.0	2.3	.1	1.8	2.7

LEGEND: HTP - Target Hits per Trigger Pull

HC - Hit Capability

Rds/Sec - Rounds per Second of Time

T - Time to Engage Targets

PTH - Percent of Targets Hit

TP - Trigger Pulls

H/TP - Hits per Trigger Pull

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CHART 12-3

POINTED FIRE ACCURACY - CARBINES  
(SEMI-AUTOMATIC)

II-94

40 METERS

WEAPON	POINTED						AIMED					
	Rds	Tgt	HC	Tgts	PTH	T	Rds	Rds	Tgt	HC	Tgts	Rds
	Fired	Hits		Hit			Sec	Fired	Hits		Hit	Sec
M14	6.0	6.0	10.0	0.4	46.3	1.7	2.0	3.6	0.8	22.2	0.6	51.8
S-C	8.2	1.0	12.2	0.7	66.7	1.6	2.7	4.2	1.4	33.3	0.8	74.0
C-SMG	7.7	0.8	10.4	0.6	55.2	1.6	2.6	4.4	0.8	18.2	0.6	58.9
												2.0
												1.5

80 METERS

M14	6.5	0.4	6.2	0.3	33.3	1.7	1.9	3.6	0.6	16.7	0.6	55.4
S-C	8.2	0.4	4.9	0.3	54.2	1.6	2.3	3.8	0.8	21.1	0.6	54.0
C-SMG	7.4	0.4	5.4	0.3	27.6	1.8	2.1	4.6	0.6	13.0	0.4	44.6
												2.2
												1.3

150 METERS

M14	6.0	0.2	3.3	0.2	14.8	2.0	1.5	3.4	0.2	5.9	0.2	21.4
S-C	10.0	0.2	2.0	0.1	20.8	1.8	2.5	4.0	0.4	10.0	0.3	32.0
C-SMG	7.6	0.1	1.3	0.1	12.1	2.2	1.9	4.6	0.2	4.3	0.2	21.4
												2.7
												1.2

LEGEND: T - Time to Engage Target  
HC - Hit Capability  
PTH - Percent of Targets Hit  
Rds/Sec - Rounds per Second of Time

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CH/ 12-4  
POINTED FIRE ACCURACY - CARBINES  
(AUTOMATIC)

II-95

WEAPON	POINTED										AIMED									
	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP		
M14	8.2	0.6	7.3	0.4	36.0	0.3	1.6	2.7	2.3	8.2	0.9	11.0	0.6	54.0	1.8	0.3	2.7	2.6		
S-C	11.0	1.2	10.9	0.6	60.4	0.3	1.8	3.7	3.5	9.1	1.4	15.4	0.8	77.1	1.9	0.5	3.3	2.7		
C-SMG	12.9	1.0	7.8	0.6	56.2	0.2	1.8	4.3	4.0	11.6	1.0	8.6	0.6	64.6	1.8	0.3	3.9	3.9		
80 METERS																				
M14	10.0	0.3	3.0	0.2	22.0	0.1	1.8	2.9	2.6	8.1	0.4	4.9	0.4	34.0	1.9	0.2	2.3	2.4		
S-C	11.3	0.4	3.5	0.2	54.2	0.1	1.8	3.2	3.7	9.2	0.7	7.6	0.5	50.0	2.1	0.2	2.6	3.0		
C-SMG	12.6	0.4	3.2	0.3	29.2	0.1	1.8	3.6	4.2	12.4	0.4	3.2	0.4	39.6	2.0	0.1	3.5	4.0		
150 METERS																				
M14	9.7	0.4	4.1	0.2	24.0	0.1	1.8	2.4	3.0	8.2	0.5	6.1	0.4	36.0	2.1	0.2	2.0	2.6		
S-C	12.2	0.3	2.5	0.2	20.8	0.1	1.9	3.0	4.0	10.6	0.4	3.8	0.2	20.8	2.2	0.1	2.6	3.6		
C-SMG	13.8	0.2	1.4	0.2	12.5	0.0	1.9	3.4	4.4	13.0	0.2	1.5	0.2	16.7	2.0	0.0	3.2	4.1		

LEGEND: H/TP - Target Hits per Trigger Pull  
TP - Trigger Pulls  
Rds/Sec - Rounds per Second of Time  
T - Time to Engage Targets  
HC - Hit Capability  
PTH - Percent of Targets Hit

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CHART 12-5  
POINTED FIRE ACCURACY - AUTOMATIC RIFLES  
(AUTOMATIC)

II-96

WEAPON	P O I N T E D										A I M E D							
	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP	Rds Fired	Tgt Hits	HC	Tgts Hit	PTH	T	H/ TP	Rds Sec	TP
M14E2	18.7	.7	7.5	.4	40.0	1.7	0.2	2.9	3.8	8.1	1.1	13.6	.5	50.0	2.0	0.3	2.7	3.2
C-AR	11.2	.8	6.7	.3	30.0	1.8	0.2	3.7	3.8	9.3	1.7	18.3	.7	70.0	2.0	0.5	3.1	3.4
S-AR	11.4	1.5	13.2	.5	50.0	1.9	0.4	3.8	3.8	8.3	1.6	20.0	.8	80.0	2.2	0.6	2.8	2.9

40 METERS

M14E2	10.1	.3	2.5	.2	20.0	1.7	0.1	3.4	4.4	8.1	.3	3.7	.3	30.0	2.2	0.1	2.7	3.4
C-AR	12.2	.5	4.1	.3	25.0	1.9	0.1	4.1	4.6	9.9	.7	6.6	.6	55.0	2.2	0.2	3.3	3.6
S-AR	11.8	.8	6.4	.5	45.0	1.9	0.2	3.9	4.4	9.3	.9	9.2	.6	60.0	2.6	0.3	3.1	3.4

80 METERS

M14E2	10.2	.4	3.4	.3	30.0	2.1	0.1	3.4	4.2	8.2	.4	4.9	.4	35.0	2.4	0.1	2.7	3.5
C-AR	13.5	.5	3.3	.4	35.0	2.0	0.1	4.5	4.6	9.7	.5	5.2	.4	40.0	2.4	0.1	3.2	3.4
S-AR	13.6	.4	3.0	.4	35.0	2.2	0.1	4.5	4.5	9.8	.6	6.1	.5	45.0	2.6	0.2	3.3	3.3

150 METERS

LEGEND: H/TP - Target Hits per Trigger Pull  
HC - Hit Capability  
Rds/Sec - Rounds per Second of Fire  
T - Time to Engage Targets  
TP - Trigger Pulls  
PTH - Percent of Targets Hit

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## II-97

[illegible]

- (1) Abbreviations (ref para 2.16.2.1.3)
- (2) Total of each type of malfunction for each M14
- (3) Rate-Malfunction occurred 1: rounds fired (example: Slot No 1, i0 Failures to Feed (FF), 1 FF occurred every 760 rounds fired)
- (4) Total malfunctions for each M14

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CHART 16-1 (Continued)  
M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFN RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBK RATE	BCS RATE	TOTAL	NATE
11	359440	4,271	2 2136		1 4271									3	1423
12	361756	4,695	2 2348		1 4695			1 4695						4	1174
13	363367	1,440	1 1440											1	1440
14	361036	6,752	11 614											11	614
15	357681	3,553	1 3553	1 3553						1 3553				3	1184
16	362231	6,578	5 1316	2 3289		1 6578								8	822
17	362648	5,398	2 2699	1 5398								1 5398		4	1350
18	1527075	4,185													
19	361252	4,010	4 1003			2 2005		1 4010				1 4010		8	501
20	363020	3,675	1 3675			1 3675						1 3675		3	1225

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CHART 16-1 (Continued)  
(3)

M14--TYPES OF MALFUNCTIONS AND RATES

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STGT NO.	SERIAL NUMBER	RDS FIELD	FT RATE	FIA RATE	FA RATE	FJ RATE	FBC RATE	FMA RATE	DF RATE	BOB RATE	FBF RATE	FBA RATE	BCS RATE	TOTAL	RATE
21	362741	6,824	3412		2275		682			1365			6824	21	325
22	5126131	6,174					6174							1	6174
23	1526384	3,756													
24	362607	5,321		1										1	5321
25	361389	5,662	1132				3			1				9	629
26	363035	6,439	2146	1			4							8	805
27	358991	6,598	3299											2	3299
28	361718	7,257	1209			3	1			2				12	605
29	360277	4,716	1		1									2	2358
30	362710	5,813	1453	2			1							7	830

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SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFN RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
31	361284	5,264	25		5264		5264			2632			29	182
32	362010	4,589	1										1	4589
33	363056	4,963	709										7	709
34	357377	4,017	1		4017								2	2008
35	358465	4,707	1				3						4	1177
36	1521665	3,666			3666								1	3666
37	1522227	5,015	1										1	5015
38	1527945	4,304	2	2152	4304								3	1435
39	360722	4,655	2327		2327	1	2			4655			8	582
40	1537013	4,264												

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CHART 16-1 (Continued)  
M14--TYPES OF M14 FUNCTIONS AND RATES

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CHART 16-1 (Continued)  
M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	DC FLIGHT	FT RATE	FTS RATE	FA RATE	FJ RATE	IBC RATE	FMA RATE	DF RATE	BOB RATE	FBV RATE	FBA RATE	BOS RATE	TOTL	NOTE
41	362015	4,742			1										
42	919297	3,584			3584									1	3584
43	363267	3,572													
44	905153	3,863	3											3	1287
45	361225	3,840	1											1	3840
46	362809	4,100	1											1	4100
47	1524923	4,600													
48	1521256	3,843			3843									1	3843
49	363024	4,085													
50	360922	4,885	1		4885									2	2443

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CHART 16-1 (Continued)  
M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIXED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	FBF RATE	FBN RATE	BCS RATE	TOTAL	RATE
51	1279906	3,190	1 3190										1	3190
52	1280199	3,026	1 3026										1	3026
53	1273834	3,755	2 1877										2	1877
54	1269018	4,247												
55	1278193	4,511												
56	1277818	4,881	1 4881		1 4881								2	2441
57	1278606	3,503	2 1691		1 3503								1	3503
58	1282371	3,382											2	1691
59	1280297	3,490												
60	1272291	4,154					2 2077						2	2077

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CHART 16-1 (Continued)  
(7)  
M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	NO. FIRED	FE RATE	F1 RATE	F2 RATE	F3 RATE	F4 RATE	F5 RATE	DF RATE	BOB RATE	FEB RATE	FBA RATE	RCS RATE	TOTAL	NOTE
61	1276387	2,276												1	2276
62	1278943	3,326													
63	1272791	3,263													
64	1278693	3,365													
65	1278406	2,877			1 2877									1	2877
66	1280365	2,549				1 2549								1	2549
67	1269929	5,836													
68	1279386	4,041													
69	339688	2,977	5 595											5	595
70	341790	2,377													

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SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBN RATE	BCS RATE	TOTAL	RATE
71	1278818	4,806									2				
72	336015	3,841									1920			2	1920
73	1282665	5,068													
74	341598	3,830	2 1915											2	1915
75	336004	2,382													
76	339636	3,634													
77	338693	3,424	7 489											7	489
78	313394	3,950	4 988											4	988
79	339594	3,385													
80	1277359	2,389													

M14--TYPES OF MALFUNCTIONS AND RATES

CHART 16-1 (Continued)  
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CHART 16-1 (Continued)

M14- TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFE RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
81	1323461	3111	1 3111	1 3111										2	1556
82	1324207	4766													
83	1277529	4016													
84	340418	4341													
85	337948	3945	2 1973											2	1973
86	338411	3932	4 983											4	983
87	340709	4649		1 4649										1	4649
88	339441	4835	2 2418											2	2418
89	341931	5224	16 327											16	327
90	340463	4678	2 2339											2	2339

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CHART 16-1 (Continued)  
M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
91	340255	3173		2										2	1828
92	335590	3655	10	1828						1				12	476
93	334570	5710	571	5710						5710				4	1286
94	342221	5144	1286												
95	339693	4618													
96	338976	6329													
97	338202	3800							1					2	1900
98	338700	4752									1			1	4752
99	331046	4187													
100	339621	4483							1					1	4483

\*TOTALS:

518,380  
200/2,592  
16/32,399  
18/28,799  
19/27,283  
29/17,875  
4/129,595  
4/129,595  
11/47,125  
5/103,676  
6/86,397  
1/518,380  
313  
1,656

LEGEND: \* Total of each type of malfunction/rate of malfunction for the M14's

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S-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	DE- FIED	OUT- SIDE	IN- SIDE	EX- TER	FI- RE	BO- TT	TR- IP	DE- FIED	BO- TT	TR- IP	PER- CENT	PER- CENT	TOTAL	ACT
121	000467	6,732	4,336	748	8356	6732	1	6732	1			3360		17	396
122	000475	5,717				1906	3							3	1906
123	000463	5,848		2929					1	5848	1949			6	975
124	000430	5,651	1413	1884	2826				1	2826				11	514
125	000468	6,765	3383						1	6765	1353			8	846
126	000471	7,219	7219	2406	2406	7219	3	2406	6	1203				18	401
127	000466	6,380		6380		6380	1		1	6380				5	1276
128	000469	6,518	3259	2173	3259	6518	1		11	593				19	343
129	000474	6,770		6770	2257	6770	1		2	3385				8	846
130	000473	4,768		4768								4768		2	2384

- LEGEND:
- (1) Abbreviations (ref para 2.16.2.1.3)
  - (2) Total of each type of malfunction for each S-R
  - (3) Rate-Malfunction occurred 1: rounds fired
  - (4) Total malfunctions for each S-R

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CHART 16-2 (Continued)

S-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FEL RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBE RATE	FBR RATE	BCS RATE	TOTAL	RATE
131	000459	1,564		1564		1564								2	782
132	000476	3,000	3000	3000	3000				3000					4	750
133	000432	5,836		2918	5836	5836			5836			5836		6	973
134	000465	4,072	2036	4072	1359	4072			2036	4072		4072		11	370
135	000433	5,576		2788				5576				5576		4	1394
136	000445	7,049													
137	000472	4,962													
138	000470	5,241	3	749	3	3			3			5241		20	262
139	000434	6,658				2219			1665			6658		8	832
140	000429	4,045	2023						4045					3	1682

TOTALS:

110,371  
17/6,492  
39/2,830  
20/5,519  
17/6,492  
3/36,790  
4/27,593  
42/2,628  
1/110,371  
10/11,037  
2/55,186  
155  
712

LEGEND: \* Total of each type of malfunction/rate of malfunction for the S-R's

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XM16E1--TYPES OF MALFUNCTIONS AND RATES

CHART 16-3

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SLOT NO.	SERIAL NUMBER	TIME FIRED	(1) FF RATE	FF RATE	FK RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBA RATE	PCS RATE	(4) TOTAL	RATE
101	156076	5,226	(2) 9 (3) 581		6	16			1	38		22		92	57
102	154065	5,638			1	14			5526	138		238			
103	153691	4,542	6 757	2 2271	23 197	11 413		4 1135	2 2271	3 1514		18 252		69	66
104	153299	5,868	2 2934	17 345	11 534	10 587				4 1467		41 143		85	69
105	153492	5,299	4 1325		8 662	28 189			7 757	15 353		33 161		95	56
106	153809	5,198	2 2599	1 5198		28 186				6 866		38 137		75	69
107	156266	4,539	4 1135	4 1135	1 4539	6 756				3 1513		28 162		46	99
108	154911	4,956	4 1239		1 4956	2			1 4956	3 1652		32 155		41	121
109	148537	4,631	4631		1 4631	2315			2 2315	1 4631		23 201		30	154
110	145774	5,450	3 1817	3 1817	1 5450	14 389			2 2725	4 1362		27 202		54	101

- LEGEND:
- (1) Abbreviations (ref para 2.16.2.1.3)
  - (2) Total of each type of malfunction for each XM16E1
  - (3) Rate-Malfunction occurred 1: rounds fired
  - (4) Total malfunctions for each XM16E1

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CHART 16-3 (Continued)

XM16E1--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	NDS FIRED	FF RATE	FFN RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBA RATE	ECS RATE	TOTAL	RATE
111	148007	4,493			4	3			1	45		38		91	49
112	124508	5,093	12 424			6 849			4 1273	9 566		25 204		56	91
113	146902	4,463	116			20 223	2 2231		2 2231	7 637		19 235		54	83
114	147663	4,438			1 4438	3 1479						18 247		22	202
115	147064	4,462	7 637		11 406	35 127			1 4462	6 737		19 235		79	56
116	148500	3,732	1 3732	1 3732	7 533	15 249		26 144	4 933	1 3732		28 133		83	45
117	148057	4,862	8 608	1 4862	5 972	22 221	1 4862		2 2431	5 972		22 221		66	74
118	155495	4,036	4 1009	4 1009		1 4036		3 1345	1 4036	21 192		30 134		64	63
119	148497	4,154	2 2077	1 4154	4 1038	9 426			3 1385	2 2077		23 181		44	94
120	145879	4,640	2 2320	5 928	1 4640	8 580				7 663		28 166	2 2320	53	88

\*TOTALS:

95,720  
75/1,276  
39/2,454  
86/1,113  
251/381  
3/31,907  
33/2,900  
33/2,900  
188/509  
532/180  
2/47,860  
1242  
77

LEGEND: \* Total of each type of malfunction/rate of malfunction for the XM16E1's

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CHART 16-4

H-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	FDS FIRED	(1) PF RATE	FIN RATE	FX RATE	FJ RATE	FBC RATE	FMC RATE	DF RATE	BOB RATE	FBF RATE	FBA RATE	BCS RATE	(4) TOTAL	WATE
141	0297	4,342	(2) 3 (3) 1447	2	2				10 395	1 4342				15	289
142	0280	4,696	5 939	2348	2348				7 470					19	247
143	0289	4,676	6 779		2338				5 668					15	312
144	0296	4,802	5 960		4802				9 960					11	437
145	0302	3,333	1 3333						3 370			3 1111		13	256
146	0295	3,921	2 1961		784				17 1307					10	392
147	0281	4,019							236					17	236
148	0298	2,728							7 390					7	390
149	0287	3,845			3 1282				8 481					11	350
150	0285	4,683	5 937		1 4683				14 335			2 2342		22	213

- LEGEND:
- (1) Abbreviations (ref para 2.16.2.1.3)
  - (2) Total of each type of malfunction for each H-R
  - (3) Rate-Malfunction occurred 1: rounds fired
  - (4) Total malfunctions for each H-R

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H-R--TYPES OF MALFUNCTIONS AND RATES

CHART 16-4 (Continued)

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FN RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FEF RATE	FBA RATE	BCS RATE	TOTAL	RATE
151	0283	4,459	2 2230						6 743					8	557
152	0299	827							12 374					12	374
153	0290	4,491	1 3757						13 289					14	405
154	0282	3,757	6 792		1 4749				6 792					13	365
155	0293	4,749	1 2055						1 2055					2	1028
156	0291	2,055	3 1439		2 2159				14 308					19	227
157	0288	4,318	2 2028		1 4055				9 451			2 2028		14	290
158	0294	4,055	1 4741						17 279					18	263
159	0303	4,741	2 765						1 1529					3	510
160	0284	1,529													

\*TOTALS:

76,026

45/1,689

2/38,013

18/4,224

170/447

1/76,026

7/10,861

243

313

LEGEND: \* Total of each type of malfunction/rate of malfunction for the H-R's

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CHART 16-5

A-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	(1) FF RATE	FPA RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	(4) TOTAL	NATE
161	039	1,852	2 2 3 926			1852				1852		1852		5	370
162	031	3,342	10 334	2 1671			3 1114		1 3342	5 668				21	159
163	044	3,404	3 1135	1 3404	3 1135	3 1135				2 1702		1 3404		13	262
164	040	3,350	1 3350	1 3350		1 3350				5 670		1 3350		9	372
165	042	5,495	5 1099		1 5495	4 1371			1 5495	5 1099				16	343
166	043	5,126	4 1281	1 5126		1 5126	1 5126			34 151				41	125
167	041	860													
168	049	3,809	8 476			2 1404			5 762	1 3809				16	238
169	056	3,710			2 1855				2 1855	1 3710				5	742
170	054	3,582	1 3582			2 1791			5 716					8	448

LEGEND: (1) Abbreviations (ref para 2.16.2.1.3)

(2) Total of each type malfunction for each A-R

(3) Rate-Malfunction occurred 1: rounds fired

(4) Total malfunctions for each A-R

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CHART 16-5 (Continued)

A-R-TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FR RATE	FJ RATE	FBC RATE	FBR RATE	DF RATE	BOB RATE	FBF RATE	FRN RATE	BGS RATE	TOTAL	NATE
171	046	2,974	2974			2974								2	1487
172	050	3,831	1915			1915			3831	3831				6	638
173	055	3,030													
174	051	4,018	1004			669			669	4018				17	236
175	057	3,456	1728			1152			157	3456				28	123
176	052	3,286	3286			1095			3286					5	657
177	048	3,517	3517			1758			12	4				20	176
178	053	3,188			1594	1063			354	1063				17	188
179	045	2,972	2972						1486					4	743
180	047	3,820				764			1910					7	546

\* TOTALS:

68,622  
16/1,412  
6/11,370  
9/7,625  
39/1,760  
4/17,155  
69/995  
64/1,072  
3/22,873  
240  
286

LEGEND: \* Total of each type of malfunction/rate of malfunction for the A-R's

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CHART 16-6

M14-- MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

M14							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
1	361762	7599	8	2			10
2	362843	5786	1				1
3	362985	6110	0		1		1
4	348587	4544	2	1	1		4
5	362845	5298	4	0			4
6	360537	6519	8	2			10
7	363119	6116	2		2		4
8	517306	4723	0		1		1
9	355524	5563	4		1		5
10	359687	6252	16	1	1		18
11	359440	4271	2	0	1		3
12	361756	4695	4				4
13	363367	1440	0		2	0	2
14	361036	6752	9	2	1		12
15	357681	3553	1	1	1		3
16	362231	6578	7		1		8
17	362648	5398	4		0		4
18	1527075	4185			2		2
19	361252	4010	6	1	1		8
20	363020	3675	3	0	0		3
M14							
21	362741	6824	18	2	2		22
22	5126131	6174	1				1
23	1526384	3756			1		1
24	362607	5321	0		1		1
25	361389	5662	7	1	1		9
26	363035	6439	8				8
27	358991	6589	2				2
28	361718	7257	9	1	5	0	15
29	360277	4716	2				2
30	362710	5813	7		2		9
31	361284	5264	22	4	2		28
32	362010	4589	1		1		2
33	363056	4963	6	1			7
34	357377	4017	1		2		3
35	358465	4707	4		1		5
36	1521665	3666	1		0		1
37	1522227	5015	1				1
38	1527945	4304	3				3
39	360722	4655	6		3		9
40	1537013	4264					

LEGEND: \*Category defined (ref para 2.16.2.1.2)

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CHART 16-6 (Continued)

M14--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SLOT NO	SERIAL NO	ROUNDS FIRED	M14				TOTAL
			CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	
41	362015	4742					
42	919297	3584			1		1
43	363267	3572					
44	905153	3863	3	0			3
45	361225	3840	1	0			1
46	362809	4100	0	0	1		1
47	1524923	4600					
48	1521267	3843			1		1
49	363024	4085					
50	360922	4885	2				2
51	1279906	3190	1				1
52	1280199	3026					
53	1273834	3755	2				2
54	1269018	4247					
55	1278193	4511			1		1
56	1277818	4881	2				2
57	1278606	3503	1				1
58	1282371	3382	2				2
59	1280297	3490					
60	1272291	4154	2				2
SLOT NO	SERIAL NO	ROUNDS FIRED	M14				TOTAL
			CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	
61	1276387	2276	1				1
62	1278943	3326					
63	1272791	3263					
64	1278693	3365					
65	1278406	2877	1				1
66	1280365	2549	1				1
67	1269929	5836					
68	1279386	4041					
69	339688	2977	4	1			5
70	341790	2377					
71	1278818	4806					
72	336015	3841	2				2
73	1282665	5068					
74	341598	3830	2				2
75	336004	2382			1		1
76	339636	3634					
77	338693	3424	6	1			7
78	313394	3950	4				4
79	339594	3385					
80	1277359	2389					

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CHART 16-6 (Continued)

M14--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SLOT NO	SERIAL NO	ROUNDS FIRED	M-14				TOTAL
			CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	
81	1323461	3111	1			1	2
82	1324207	4766					
83	1277629	4016					
84	340418	4341					
85	337948	3945	2				2
86	338411	3932	4				4
87	340709	4649			1		1
88	339441	4835	2				2
89	341931	5224	16				16
90	340463	4678	2				2
91	340255	3173					
92	335590	3655	2				2
93	334570	5710	10	1	1		12
94	342221	5144	4				4
95	339693	4618					
96	338976	6329					
97	338202	3800	1		1		2
98	338700	4752			1		1
99	331046	4187					
100	339621	4483		1			1

TOTALS: 418,380 261 23 46 1 331

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CHART 16-7

## RIFLES--MALFUNCTIONS AND BROKEN, DAMAGED AND LOST PARTS BY CATEGORY

S-R							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
121	000467	6732	12	3	2		17
122	000475	5717	3				3
123	000463	5848	6	0			6
124	000439	5651	9	1	1		11
125	000468	6765	5	2	2		9
126	000471	7219	17	1			18
127	000466	6380	2	0	3		5
128	000469	6518	16	2	1		19
129	000474	6770	8				8
130	000473	4768	1	0	1		2
131	000459	1564	0	0	2		2
132	000476	3000	4				4
133	000432	5836	6			1	7
134	000465	4072	10	1			11
135	000433	5576	3	1		1	5
136	000445	7049		0			0
137	000472	4962					
138	000470	5241	15	2	3		20
139	000429	6658	5	2	1		8
140	000429	4045	0		3		3
TOTALS		110371	122	15	19	2	158
XM16E1							
101	156076	5226	80	12	2		94
102	154065	5638	40	3	2		45
103	153691	4542	59	8	0	2	69
104	153299	5868	76	7	4		87
105	153492	5299	87	7	4		98
106	153809	5198	69	4	3		76
107	156266	4539	43	1	2		46
108	154911	4956	40		2		42
109	148537	4631	29		0	1	30
110	145774	5450	48	2	6		56
111	148007	4493	82	7	6		95
112	124508	5093	51	4	4		59
113	142902	4463	50	2	6		58
114	147663	4438	21		1		22
115	147064	4462	69	10	0		79
116	148500	3732	80	0	2	1	83
117	148057	4862	60	4	4		68
118	155495	4036	63	1	2		66
119	148497	4154	42	1	2	1	46
120	145879	4640	51	1	3		54
TOTALS		95720	1140	74	55	5	1274

LEGEND: \*Category defined (ref para 2.16.2.1.2)

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CHART 16-7 (Continued)

RIFLES--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SLOT NO	SERIAL NO	ROUNDS FIRED	H-R				TOTAL
			CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	
141	0297	4342	8	7	1		16
142	0280	4696	6	13	1		20
143	0289	4676	11	4	2		17
144	0296	4802	9	1	1	1	12
145	0302	3333	10	2	2		14
146	0295	3921	3	6	1		10
147	0281	4019	4	12	2		18
148	0298	2728	2	4	1		7
149	0287	3845	5	5	1		11
150	0285	4683	20	2	2		24
151	0283	4459	7	0	1		8
152	0299	827			0	1	1
153	0290	4491	7	5			12
154	0282	3757	10	2	1		13
155	0293	4749	11	1	1		13
156	0291	2055	2		1		3
157	0288	4318	10	8	1		19
158	0294	4055	9	4	2		15
159	0303	4741	15	2	1		18
160	0284	1529	2	1	1		4
TOTALS		76026	151	79	23	2	255
SLOT NO	SERIAL NO	ROUNDS FIRED	A-R				TOTAL
			CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	
161	039	1852	2		3	1	6
162	031	3342	18	1	3		22
163	044	3404	9	1	4	1	15
164	040	3350	7	2			9
165	042	5495	14	1	2	2	19
166	043	5126	39	2	1	1	43
167	041	860			1	1	2
168	049	3809	14	1	2	1	18
169	056	3710	4		1	1	6
170	054	3582	6	0	2		8
171	046	2974	2			1	3
172	050	3831	6	0	1	1	8
173	055	3030				2	2
174	051	4018	15	2	1	1	19
175	057	3456	24	4	1	1	30
176	052	3286	5				5
177	048	3517	18	2			20
178	053	3188	16	1	1	0	18
179	045	2972	3	0	1	0	4
180	047	3820	6	1		0	7
TOTALS		68622	208	18	24	14	264

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## CHART 16-8

RIFLES--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS WERE ATTRIBUTED

Weapon	Part	No of Occurrences	Av No* of Rounds	Remarks
M14	Bolt	4	2315	Extractor came out during firing, bolt came apart.
	Bolt Roller	8	4625	Cracked or broke.
	Extractor Spring Plunger	1	748	Broke.
	Extractor	3	1766	Bolt failed to lock
	Ejector	1	4369	Broke.
	Firing Pin	3	3604	Broke.
	Gas Cylinder	2	1150	Cracked.
	Operating Rod Spring	1	1143	Broke.
	Gas Piston	1	112	Burred.
	Ruptured Cartridge Case	4	2553	M62 (LC 12266)
S-R	Bolt	6	3073	Cracked or broke.
	Bolt Stop	5	2493	Broke.
	Carrier and Piston Ass.	3	1763	Bolt carrier and piston separated.
	Hammer	2	3745	Broke.
	Flange, Driving Spring	2	3854	Broke.
	Bolt Stop Pin	1	152	Lost.
XM16E1	Bolt	4	3641	Cracked or broke.
	Key, Bolt Carrier	4	987	(1) Replaced, (3) Retorqued.
	Spring, Extractor	8	3913	Broke.
	Pin, Extractor	2	3377	Broke.
	Disconnect	8	3607	Broke.
H-R	Operating Rod Pin	13	2403	Operating rod pin came loose and binded on the operating rod tube, recurring.
A-R	Weld Assembly Guide Rods	6	1884	Guide rods separated from Casting, Plate.
	Pivot, Receiver	1	1852	Broke.
	Upper Bolt Catch	3	2683	Broke.
	Ruptured Cartridge Case	1	826	M196 (WCC 6089)

LEGEND: \*Average number of rounds fired in weapons which incident occurred.

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CHART 16-9

RIFLES--BROKEN, DAMAGED AND LOST PARTS TO WHICH MALFUNCTIONS WERE NOT ATTRIBUTED

Weapon	Part	No of Occurrences	Av No* of Rounds	Remarks
M14	Windage Knob Pinon Assembly	2	128	Stripped
	Set Screw, Flash Suppressor	4	2778	Loosen and/or lost
	Front Sight Guard	1	951	Cracked
	Rear Sight Cover	1	5117	Cracked
	Lock Pin, Connector	2	4388	Lost
	Gas Cylinder Plug	1	4615	Cracked
	Stock	6	1246	Cracked and Charred (7 and 10-rd bursts)
	Handguard Assembly	1	6588	Cracked
S-R	Selector Switch	1	156	Inoperative
	Take-down Pin	1	1453	Separated from Trigger Housing Group
	Locking Detent, Front Sight	1	1028	Redrilled
XM16E1	Selector Switch	1	1244	Inoperative
	Front Sight Taper Pins	2	749	Loose and/or lost
	Buffer Assembly	5	2655	Roll pins separated and/or deformed
	Pin Roll Rear Swivel	1	3617	Rear swivel assembly separated from stock
	Pin, Firing Pin Retaining	24	1896	Cracked, but did not separate from bolt carrier
	Pin Front Swivel	1	2841	Front swivel separated from front sight
H-R	Set Screw Bayonet Adapter	5	2545	Loosen and/or lost, bayonet adapter assembly separated
	Adjusting Screw, Rear Sight	1	3875	Loosen
	Set Screw, Rear Sight	1	2938	Separated w/rear sight assembly tram barrel and receiver group
	Bolt Stop Spring	5	2110	Tip broke on spring, lost

LEGEND: \*Average number of rounds fired in weapons which incident occurred.

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CHART 16-9 (Continued)

RIFLES--BROKEN, DAMAGED AND LOST PARTS TO WHICH MALFUNCTIONS WERE NOT ATTRIBUTED

Weapon	Part	No of Occurrences	Av No of Rounds	Remarks
A-R	Bolt Carrier Assembly	1	1701	Burred preventing removal of firing pin
	Lower Receiver (Magazine Housing)	1	4985	Weld cracked on corner of magazine housing
	Lower Receiver (Back Plate)	7	3844	Weld cracked on back plate
	Barrel Extension	1	860	Cracked
	Spiral Pin, Take-down Plunger	1	599	Lost; plunger take-down, spring, guide rod plate came apart
	Swivel Sling, Front Sight	1	1852	Separated from front sight
	Taper Pin, Front Sight	1	873	Loosen and/or lost
	Liner, Upper Handguard	4	3785	(3) Loosen fm upper handguard (1) Separated fm upper handguard
	Upper Handguard	5	4114	Cracked
	Rear Sight	1	3030	Weld cracked
	Housing, Take-down Plunger	1	599	Broke off guide rod plate

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S-C--TYPES OF MALFUNCTIONS AND RATES

CHART 16-10

SLOT NO.	SERIAL NUMBER	RDS FIRED	(1) FF RATE	FF RATE	FX RATE	FJ RATE	FBC RATE	BUB RATE	DF RATE	BOB RATE	FBE RATE	FTE RATE	FBR RATE	(4) TOTAL	RATE
1	000518	2898	3 (2) 966(3)		3	966			3	966	6	483		15	193
2	000510	4651							1	4651	1	4651		2	2326
3	000512	4874	1 4874	2 2437	2 2437				6	812			5 975	16	305
4	000515	5008	2 2504		23 218				3 835					31	162
5	000508	4345	3 1448	1 4345	1 4345				3 1448	1 4345				9	483
6	000535	2129			2 1065				2 1065					4	532
7	000519	4280	6 713		4280				4280					8	535
8	000513	3409	1 3409	1 3409	2 1705				1 3409					5	682
9	000536	6807	5 1361		12 567				1 6807	1 6807				19	358
10	000509	4829	3 1610		13 371				7 690	1 4829				24	201

LEGEND:

- (1) Abbreviations (ref para 2.16.2.1.3)
- (2) Total of each type of malfunction for each S-C
- (3) Rate-Malfunction occurred 1: rounds fired
- (4) Total malfunctions for each M14

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S-C--TYPES OF MALFUNCTIONS AND RATES

CHART 16-10 (Continued)

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FEK RATE	FX RATE	FJ RATE	FBC RATE	BOB RATE	DF RATE	BOB RATE	FBF RATE	FTK RATE	FBR RATE	TOTAL	RATE
11	000537	4652			3 1551			3 1610	1 4652	3 1551	1 4652			8	582
12	000522	4831	2 2416					2 1792		4 1208				9	537
13	000570	3584	5 717					2 3584						8	448
14	000520	3812			1 3812			1 3812		2 1906	1 3812	1 3812		6	635
15	000511	3964	11 360		3 1321	1 3964		4 991		1 3964				20	198
16	000524	4934	6 822	1 4934				1 4934		1 4934				9	548
17	000529	4372	1 4372					4 1093		9 486				14	312
18	000528	4104	3 1368	7 586				3 1368		1 1915				13	316
19	000505	1915		1 1915				1 1919						3	638
20	000514	3709	8 464	1 3709										9	412

\*TOTALS:

83,107

60/1,385

14/5,636

65/1,278

1/83,107

3/27,702

42/1,978

38/2,187

2/41,553

1/83,107

5/16,621

231

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LEGEND \* Total of each type of malfunction/rate of malfunction for the S-C's

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CHART 16-11

C-SMG--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	(DIFF RATE	PER. RATE	FX RATE	FJ RATE	FBC RATE	BUB RATE	DI RATE	BOB RATE	FBF RATE	FTL RATE	FBR RATE	(4) TOTAL	RATE
1	014617	1836	1 (2) 1836(3)										230	9	204
2	014631	5364											894	6	894
3	014635	4525	2 2263		2 2263					1 4525			12 377	17	377
4	014639	4702				1 4702			5 940				6 784	12	784
5	014629	4549											3 1516	3	1516
6	014615	4006							1 4006				9 445	10	445
7	014608	3979											7 568	7	568
8	014621	5140	7 734		2 2570						1 5140		16 321	26	321
9	014635	6224	8 778		3 2075				1 6224				10 622	22	622
10	014622	5740	2 2870	2 2870	1 5740								8 718	13	718

LEGEND:

- (1) Abbreviations (ref para 2.16.2.1.3)
- (2) Total of each type of malfunction for each C-SMG
- (3) Rate-Malfunction occurred 1: rounds fired
- (4) Total malfunctions for each C-SMG

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CHART 16-11 (Continued)

C-SMG--TYPES OF MALFUNCTIONS AND RATES

SLOT NO.	SERIAL NUMBER	RDS FIRED	FF RATE	FFK RATE	FX RATE	FJ RATE	FBC RATE	BUB RATE	DF RATE	BOB RATE	FBF RATE	FTK RATE	FBR RATE	TOTAL	RATE
11	014633	3785	1		8				1				7	16	541
12	014625	3127	3127		15				3	1042			4	23	782
13	014628	3669	3669		1	3669							2	5	1835
14	014609	3133			4	3133							2	3	1567
15	014637	3743	1872		936				1	3743			3	10	1248
16	014630	3439	3439		1	3439			1	3439			4	8	860
17	014654	2857							2				3	5	952
18	014603	3028							1429				2	2	1514
19	014601	4417	2209		3								6	12	738
20	014605	4608			8				1				4	13	1152

\*TOTALS:

81,871 29/3,823 4/20,467 43/1,904 2/40,935 11/7,443 6/13,645 1/81,871 122/671 222 369

LEGEND: \*Total of each type of malfunction/rate of malfunction for the C-SMG's

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CHART 16-12

\*CARBINES - MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

C-SMG							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY ** I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
1	014617	1836	9				9
2	014631	5364	6				6
3	014635	4525	16	1			17
4	014639	4702	12				12
5	014629	4549	3				3
6	014615	4006	10				10
7	014608	3979	6		1		7
8	014621	5140	25			1	26
9	014636	6224	22				22
10	014622	5740	11	2			13
11	014633	3785	13	3			16
12	014625	3127	22		1		23
13	014628	3669	5				5
14	014609	3133	3				3
15	014637	3743	8		1	1	10
16	014630	3439	7		1		8
17	014654	2857	5				5
18	014603	3028	2				2
19	014601	4417	9	3			12
20	014605	4608	8	5			13
TOTALS		81,871	201	14	4	2	222

S-C							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY ** I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
1	000518	2898	19	2	4		15
2	000510	4651	1	1			2
3	000512	4879	11	1	4		16
4	000515	5008	19	4	8		31
5	000508	4345	5	4			9
6	000535	2129	2	2			4
7	000519	4280	8				8
8	000513	3409	4			1	5
9	000536	6807	12	7			19
10	000509	4829	14	8	2		24
11	000537	4652	5	3			8
12	000522	4831	7		2		9
13	000570	3584	7		1		8
14	000520	3812	4	1	1		6
15	000511	3964	18	2			20
16	000524	4934	8		1		9
17	000529	4372	9	5			14
18	000528	4104	13				13
19	000505	1915	2			1	3
20	000514	3709	9				9
TOTALS		83,107	167	40	22	3	232

\* M14 malfunctions and broken, damaged and lost parts by category (ref Chart 16-6).  
 \*\* Category defined (ref para 2.12.2.1.2)

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CHART 16-13

\*CARBINES--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS WERE ATTRIBUTED

WEAPON	PART	NO OF OCCURRENCES	AV NO** RDS FIRED	REMARKS
S-C	Bolt	2	3,278	Cracked
	Bolt Stop Pin	1	418	Missing
	Bolt Handle	1	204	Disengaged
	Bolt Stop	3	2,490	Broken
	Extractor	1	3,484	Broken
	Operating Spring Guide Pin	1	703	Missing
	Gas Piston	1	36	Separated from bolt carrier
C-SMG	Bolt	2	4,569	Cracked
	Extractor Spring	1	3,375	Broken

LEGEND: \* M14 broken, damaged and lost parts to which malfunctions were attributed are totaled with the M14 candidate rifles (ref Chart 16-8).  
 \*\* Average number of rounds fired in weapons which incident occurred.

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CHART 16-14

\*CARBINES--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS  
WERE NOT ATTRIBUTED

WEAPON	PART	NO OF OCCURRENCES	AV NO** RDS FIRED	REMARKS
S-C	Gas Port	7	3,272	Ring Frozen
	Bayonet Stud Pin	1	459	Missing
	Front Sight	1	0	Frozen
	Front Sight Pin	2	243	Missing
C-SMC	Charging Handle	1	3,028	Binding

LEGEND: \* M14 broken, damaged and lost parts to which malfunctions  
were not attributed are totaled with the M14 candidate  
rifles (ref Chart 16-9).

\*\* Average number of rounds fired in weapons which incident  
occurred.

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CHART 16-15

M14E2--TYPES OF MALFUNCTIONS AND RATES

SERIAL NUMBER	ROUNDS FIRED	OFF RATE	FFR RATE	FX RATE	IJ RATE	IBC RATE	IFR RATE	FER RATE	BUB RATE	DF RATE	BFE RATE	FML RATE	IPS RATE	SLMT RATE	TOTAL RATE
1276185	5219													1	9
1274200	8378	1 8378	3 2793	2 4189	1 8378	1 8378							1 1136	8378	931
1279572	1136	3 379	2 5571	1 1136											5
1263822	11,142	3 3714	2 5571												22
1282842	9155		2 3052	13 704		6 1546									416
1281373	10,277														0
1261664	6,681	5 1336	2 3340	2 3340	6 1114	1 6681				1 10357					16
1271048	10,357									1 10357					418
1279533	8,110	1 10671								1 8110					1
1279552	10,671											1 10671			8110
1275968	9,421		2 4710	3 3140				1 9421							2
1282015	6,545	6 1091													15336
1264740	1,466														6
1271316	8,431					1 8431									1570
1279160	298														6
(5) TOTALS:		107,287	19/5647	12/3940	21/5109	7/15327	9/11921	1/107287	2/53644			1/107237	1/107237	1/107237	74/1450

- LEGEND:
- (1) Abbreviations (ref para 2.16.2.1.3).
  - (2) Total each type malfunction for each M14E2.
  - (3) Rate-Malfunctions occurred 1: rounds fired.
  - (4) Total malfunctions for each M14E2.
  - (5) Total each type malfunction/rate of malfunction for M14E2's.

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C-A-R--TYPES OF MALFUNCTIONS AND RATES

SERIAL NUMBER	ROUNDS FIRED	REF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	IFR RATE	FMR RATE	BUB RATE	DF RATE	BFE RATE	FML RATE	LPS RATE	SLMF RATE	TOTAL*
014719	1,524			3											3
014778	8,035	(2) 1		2678											2678
014716	841	(3) 841													841
014791	8,353			5									22		27
				1671									380		309
014746	8,572		4	14								1	3		22
			2143	612								8572	2857		390
014749	8,290	1		9						1	1				12
		8290		921						8290	8290				691
014788	6,037	5		38						20			1		64
		1207		159						302			6037		94
014781	7,636	3		15									3		21
		2545		509									2545		364
014721	6,978	1	1	7											9
		6978	6978	997									19		775
014765	8,939	3		17						3			470		43
		2980		526						2980			1		208
014748	6,122	3		14									6122		18
		2041		437											340
014787	5,138			1											1
				5138											5138
014717	1,538														0
014766	7,121	2		4											11
		3560		1780						2					647
014725	175														
UNRECORDED		0	0	1	0	0	0	0	0	0	0	0	2	0	3

(5) TOTALS:

85,299

19/4489

5/17060

128/666

3/28433

1/85299

26/3281

1/85299

1/85299

51/1672

235/363

LEGEND:

- (1) Abbreviations (ref para 2.16.2.1.3).
- (2) Total each type malfunction for each C-AR.
- (3) Rate-Malfunction occurred 1: rounds fired.

- (4) Total malfunctions for each C-AR.
- (5) Total each type malfunction/rate of malfunction for C-AR's.

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S-A--FEES OF MALFUNCTIONS AND ALES

CHAL. 16-17

SERIAL NUMBER	ROUNDS FIRED	PR RATE	FFR RATE	FX RATE	FJ RATE	EBG RATE	IFR RATE	FFR RATE	BOB RATE	DF RATE	BFE RATE	FML RATE	LFS RATE	SLWT RATE	TOTAL RATE
000497	4,215	2 2108		2 2108											4 1054
000490	7,603	4 1901	1 7603	5 1521	3 2534		10 760			10 760					33 230
000491	1,459	3 486		3 486			8 182			1 1459					15 97
000486	7,089	7 1013	1 7089	17 417	1 7089		1 7089			3 2363					30 236
000492	8,746	12 729	6 1458	19 460	1 8746		6 1458						3 2915		47 186
000504	7,037	5 1407		9 782	1 7037		1 7037			3 2346					19 370
000492	8,155	3 2718		7 1165	1 8155		6 1359		1 8155						18 453
000489	7,769	1 7769		7 1110	6 1295		11 706								25 311
000496	5,699	6 950		1 5699	2 2850		3 1900						1 5699		13 438
000495	5,702	1 5702								1 5702					2 2851
000498	6,505	2 3252		2 3252			2 3252			2 3252			4 1626		12 542
000499	6,775	1 6775			1 6775		2 3388			1 6775					5 1355
000494	2,920				1 2920		2 1460			2 1460					5 584
000488	8,291		5 1658	11 754			11 754			4 2073					31 267
000487	706	1 706					2 353			1 706					4 176

(5) TOTALS:

88,671  
48/1847  
16/6821  
83/1068  
17/5216  
65/1364  
1/88671  
28/3167  
8/11084  
263/337

LEGEND:

- (1) Abbreviations (ref para 2.16.2.1.3).
- (2) Total each type malfunction of each S-AR.
- (3) Rate-Malfunction occurred 1: rounds fired.
- (4) Total malfunctions for each S-AR.
- (5) Total of each type malfunction/rate of malfunction for S-AR's.

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CHART 16-18

M14E2--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SERIAL NUMBER	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
1276185	5,219	0	1	1	0	2
1274200	8,378	8	0	2	0	10
1279572	1,136	5	0	0	0	5
1263822	11,142	5	0	1	1	7
1282842	9,155	22	0	0	0	22
1281383	10,277	0	0	1	0	1
1261664	6,681	16	1	1	0	18
1271048	10,357	1	0	0	0	1
1279533	8,110	1	1	0	0	2
1279552	10,671	2	0	1	0	3
127968	9,421	4	1	1	1	7
1282015	6,545	6	0	2	0	8
1264740	1,466	0	0	0	0	0
1271316	8,431	1	0	0	0	1
1279160	298	0	0	0	0	0
UNRECORDED		0	0	0	2	2

TOTALS: 107,287 71 4 10 4 89

LEGEND: \* Category defined (ref para 2.16.2.1.2)

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CHART 16-19

C-AR--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SERIAL NUMBER	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
014719	1,524	0	0	0	0	0
014778	8,035	3	0	2	0	5
014716	841	1	0	0	0	1
014791	8,353	27	0	0	0	27
014746	8,572	17	0	5	1	23
014749	8,290	12	0	1	0	13
014788	6,037	63	0	2	0	65
014781	7,636	19	0	2	1	22
014721	6,978	8	0	1	0	9
014765	8,939	41	0	2	1	44
014748	6,122	16	0	1	1	18
014787	5,138	1	0	0	0	1
014717	1,538	0	0	0	0	0
014766	7,121	10	0	1	1	12
014725	175	0	0	0	0	0
UNRECORDED		0	0	2	1	3

TOTALS: 85,299 218 0 19 6 243

LEGEND: \* Category defined (ref para 2.16.2.1.2)

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# CONFIDENTIAL

CHART 16-20

## S-AR--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

SERIAL NUMBER	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
000497	4,215	4	0	3	0	7
000490	7,603	33	0	1	0	34
000491	1,459	14	1	0	0	15
000486	7,089	29	0	2	0	31
000493	8,746	46	0	1	2	49
000504	7,037	19	0	0	1	20
000492	8,155	18	0	2	0	20
000489	7,769	25	0	0	0	25
000496	5,699	13	0	0	1	14
000495	5,702	2	0	0	0	2
000498	6,505	11	0	0	1	12
000499	5,775	4	1	0	0	5
000494	2,920	5	0	1	0	6
000488	8,291	30	1	1	0	32
000487	706	4	0	2	0	6
TOTALS:	88,671	257	3	13	5	278

LEGEND: \*Category defined (ref para 2.16.2.1.2)

# CONFIDENTIAL

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**CONFIDENTIAL**

CHART 16-21

M14E2--BROKEN, DAMAGED AND LOST PARTS TO WHICH MALFUNCTIONS  
WERE ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO OF RDS WHEN OCCURRED	REMARKS
1275968	Operating Spring	1	3,277	Broken
1274200	Cartridge	1	6,270	Failed to extract, cartridge broke off in chamber.
1275968	Cartridge	1	7,722	Failed to extract, cartridge broke off in chamber.

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CHART 16-22

M14E2--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS  
WERE NOT ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO OF RDS WHEN OCCURRED	REMARKS
1276185	Shoulder Rest Spring	1	1,253	Broken while firing
1276185	Stabilizer Assembly	1	1,208	Fell off while firing
1281373	Stabilizer Assembly	1	1,331	Fell off and destroyed by following rounds
1261664	Stabilizer Assembly	1	373	Fell off and destroyed by following rounds
1279533	Stabilizer Assembly	1	2,391	Fell off while firing
1282015	Stabilizer Assembly	1	1,069	Fell off while firing and destroyed by following rds
1263822	Front Hand Grip	1	812	Snapped off while trying to free compensator
1274200	Forestock	1	2,835	Cracked while firing
1261664	Stock	1	4,308	Burned while firing
1279552	Stock	1	923	Burned while firing
1282015	Stock	1	2,329	Burned while firing
1263822	Front Sight	1	2,112	Fell off (vibrated loose)
1275968	Bipod	3	696	Broke--(noticed while cleaning)

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## CHART 16-23

C-AR, BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS  
WERE ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO OF RDS WHEN OCCURRED	REMARKS
014747	Extractor Spring	1	3,739	Broke while firing
014781	Extractor Spring	1	4,819	Broke while firing
014765	Extractor Spring	1	5,798	Broke while firing
014748	Extractor Spring	1	4,104	Broke while firing
014766	Extractor Spring	1	5,283	Broke while firing
014721	Firing Pin	1	2,768	Broke while firing
014746	Action Spring Guide Assembly	3	(1) 1,708	Broke while firing
014746	Action Spring Guide Assembly	1	(2) 1,093	Broke while firing
014746	Action Spring Guide Assembly	1	(3) 750	Broke while firing
014781	Action Spring Guide Assembly	1	2,597	Broke while firing
014765	Action Spring Guide Assembly	1	2,309	Broke while firing
014748	Action Spring Guide Assembly	1	3,021	Broke while firing
014788	Action Spring Guide Assembly	1	3,520	Broke while firing
014746	Bolt	1	889	Broke while firing
	Bent gas ring on bolt	1*		Bent while firing

### LEGEND:

- \* Not recorded and not identified with a particular C-AR.
- (1) First occurrence.
- (2) Number of rounds since 1st occurrence.
- (3) Number of rounds since 2nd occurrence.

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CHART 16-24

C-AR--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS WERE  
NOT ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO OF RDS WHEN OCCURRED	REMARKS
014778	Firing Pin Retaining Pin	1	1,175	Bent--unable to fit into hole
014788	Firing Pin Retaining Pin	1	1,389	Bent--unable to fit into hole
014781	Firing Pin Retaining Pin	1	2,358	Lost--discovered while cleaning
014746	Firing Pin Retaining Pin	1	2,801	Bent--unable to fit into hole
014788	Handguards	1	487	Cracked--discovered after portability test
014749	Buffer Retainer	1	2,552	Vibrated loose and fell into the receiver group
014766	Bolt	1	1,648	Front of bolt chipped discovered during inspection of parts
014765	Bolt	1	2,552	Result of a bent magazine

CHART 16-25

S-AR--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS WERE  
ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO OF RDS WHEN OCCURRED	REMARKS
00491	Magazine	1	1,731	Failed to seat properly due to bent mag.
000493	Piston Rings	1	2,825	Bent during firing
000498	Piston Rod	1	2,267	Separated from carrier while firing
000486	Trigger Pin	1	500	Came out while firing

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CHART 16-26

S-AR--BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS WERE NOT ATTRIBUTED

SERIAL NUMBER	PART	NO OF OCCURRENCES	NO RDS WHEN OCCURRED	REMARKS
000490	Housing and Sight Assembly Pin	1	925	Nic in pin--replacer
000486	Housing and Sight Assembly Pin	1	550	Missing--noticed after completion of firing
000497	Housing and Sight Assembly Pin	1	1,174	Bent--noticed during inspection of parts
000494	Housing and Sight Assembly Pin	1	1,266	Bent--noticed during inspection of parts
000488	Housing and Sight Assembly Pin	1	518	Fell out while firing
000487	Housing and Sight Assembly Pin	1	700	Bent--noticed during inspection of parts
000497	Forestock Assembly	1	4,215	Broken during parachute jump
000496	Windage Knob	1	4,573	Broken during firing
000492	Magazine Latch	1	6,198	Broken during firing
000497	Magazine Latch	1	2,212	Broken during firing
000492	Cam Pin	1	1,155	Nic on the side
000487	Adapter Pin	1	350	Bent
000504	Recoil Pad	1	1,089	Beginning to separate from butt of stock
000493	Rear Sight Assembly Holding Catch	1	1,169	Bent
000493	Bipod	1	N/A	Lost during portability test

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M60--TYPES OF MALFUNCTIONS AND RATES

M60	RDS FIRED	(1) FF RATE	FFM RATE	FX RATE	FJ RATE	FBC RATE	BUB RATE	FMR RATE	FBF RATE	FBF RATE	(4) TOTAL RATE
58592R	13,294	(2) 6 (3) 2,216	1 13,294								7 1,899
55066R	4,543	1 4,543									1 4,543
56236R	9,312	1 9,312		1 9,312							2 4,656
56269R	10,095				1 10,095				1 10,095		2 5,048
55017R	5,701			3 1,900							3 1,900
55228R	8,804	1 3,959		2 4,402		1 8,804					3 2,932
55873R	3,959	1 3,959									1 3,959
55554R	10,094										
52012R	4,400			1 4,400							1 4,400
51869R	10,069		1 10,069								1 10,069
54540R	10,217	1 10,217			1 10,217						2 5,109
55733R	5,052										
55132R	10,100	1 10,100			1 10,100						1 10,100
55390R	7,948	1 7,948									1 7,948

LEGEND:

- (1) Abbreviations defined (ref para 2.16.2.1.3)
- (2) Total of each type of malfunction for each M60
- (3) Rate-Malfunction occurred 1: rounds fired
- (4) Total malfunctions for each M60

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## 11-142

11-142

**CONFIDENTIAL**

181,768

3/60589

3/60589

1/181768

34/5346

LEGEND: \* Total of each type of malfunction for M60's.

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CODE S-- TYPES OF MALFUNCTIONS AND RATES

CHART 16-28

11-143

CODE S	RDS FIRED	(1) FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	BUB RATE	FMR RATE	FBF RATE	FBR RATE	(4) TOTAL RATE
000540	5,330	(2) 3 (3) 1,777	8 666								11 485
000543	3,926	8 491	12 327	1 3,926	1 3,926						22 178
00575	5,417	4 1,354		2 2,708	2 2,708						8 677
000569	5,074	16 317	1 5,074	1 5,074	2 2,537				1 4,096		20 254
000545	4,096	31 132	5 819	2 2,048	2 2,048						41 100
000580	9,492	51 186	83 114	20 475	20 475		36 264				210 45
000539	9,820	114 87	50 195	12 822	19 519		36 274				231 43
000604	4,270	13 328	4 1,068	7 610	2 2,135						26 164
000557	3,158	5 632									5 632
000605	3,770	4 942	1 3,770	3 1,257	1 3,770						9 419
000567	7,882	28 281	32 246	6 1,314	11 717		3 2,627				80 99
000544	9,768	15 651	21 465	13 751	18 543		2 4,884				69 142
000583	8,513	30 284	53 161	10 851	8 1,064		1 8,513				102 83
000579	5,050	25 202	21 241	11 460	13 389	3 1,686	7 722				80 63

- LEGEND: (1) Abbreviations (ref para 2.16.2.1.3)  
(2) Total of each type of malfunction for each Code S-MG  
(3) Rate-Malfunction occurred 1: rounds fired  
(4) Total malfunctions for each Code S-MG

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CHART 16-28 (Continued)  
CODE S--TYPES OF MALFUNCTIONS AND RATES

CODE S	RDS FIRED	FE RATE	FFA RATE	FX RATE	FJ RATE	FBC RATE	BOB RATE	FMR RATE	FBF RATE	FBF RATE	TOTAL RATE
000610	6,387	9 710	14 456	5 1,277	10 639	1 5,730		1 5,730	1 6,387	1 6,387	40 160
000560	5,730	819 19	122 122	955 15	5,730 27						63 91
000568	8,919	469	73	595	330		37 241				220 41
000551	10,765	36 299.0	27 398.7	5 2153.0	3 3588.3		5 2153.0				76 142
000552	11,033	38 290.3	42 262.7	6 1838.8	7 1576.1		10 1103.0				103 107
000611	3,865	20 193.3	4 966.3	3 1288.3	4 966.3						31 125
000576	4,471	9 496.8	6 745.2	1 4471.0	1 4471.0						17 263
000585	3,704	3 411.6	5 740.8								14 265
000591	1,430	3 476.7									3 477
000550	10,203	37 275.8	65 157.0	13 784.8	11 927.5						126 81
000548	3,184	59 54.0	8 398.0	3 1061.3	1 3184.0		9 353.8				80 40
000564	9,576	88 108.8	81 118.2	33 290.2	67 142.9		60 159.6				329 29
000577	2,315	1 2315.0	18 128.6	3 771.7	1 2315.0		1 2315.0				24 96
000563	4,235	5 847.0	4 1058.8	6 705.8	3 1411.7						18 235

\*TOTALS:

171,383

687/249

734/233

187/916

235/729

4/42845

207/828

1/171383

2/85691

1/171383

2058/83

LEGEND: \* Total of each type of malfunction/rate of malfunctions for the Code S-MG's.

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CHART 16-29

## M60-MG--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

M60	Rds Fired	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
58592R	13,294	7		2		9
55066R	4,543		1			1
56236R	9,312	1	1	1		3
56269R	10,095	1	1			2
55017R	5,701	1	2			3
55228R	8,804	3				3
55873R	3,959	1				1
55554R	10,094					
52012R	4,400		1			1
51869R	10,069	1		1		2
54540R	10,217					
55733R	5,052	2				2
55132R	10,100					
55390R	7,948	1				1
56216R	10,009	1				1
55879R	4,994					
55613R	3,562	1				1
55007R	10,117					
55334R	5,529	1				1
54577R	1,643					
54823R	10,042		2			2
55131R	4,567	1				1
55503R	3,857		2			2
55758R	9,525					
58716R	4,335		2	2		4
TOTAL	181,763	22	12	6		40

LEGEND: \*Category defined (ref para 2.16.2.1.2)

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CHART 16-30

CODE S-MG--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST  
PARTS BY CATEGORY

CODE S	Rds Fired	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
000540	5,330	5	4	2		11
000543	3,926	18	4			22
000575	5,417	5	3			8
000569	5,074	14	6			20
000545	4,096	29	10	2		41
000580	9,492	156	54		1	211
000539	9,820	188	43			231
000604	4,270	21	4	1		26
000557	3,158	4	1		1	6
000605	3,770	6	3	1	1	11
000567	7,882	69	11	1		81
000544	9,768	59	3	8		70
000583	8,513	95	7	1		103
000579	5,050	52	28			80
000610	6,387	28	12		1	41
000560	5,730	46	16		1	63
000568	8,919	176	43	3		222
000551	10,765	61	15			76
000552	11,033	83	20			103
000611	3,865	22	6	1	2	31
000576	4,471	15	2			17
000585	3,704	10	3		1	14
000591	1,430	2	1		1	4
000550	10,203	123	3		1	127
000548	3,184	60	20	1		81
000564	9,576	260	67	1	1	329
000577	2,315	18	6	1		25
000563	4,235	13	4	1	1	19
TOTAL	171,383	1,638	399	24	12	2,073

LEGEND: \* Category defined (ref para 2.16.2.1.2)

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CHART 16-31

M60-MG--BROKEN, DAMAGED, AND LOST PARTS, TO WHICH MALFUNCTIONS  
WERE ATTRIBUTED

PART	WEAPON SERIAL NO	NO RDS WHEN OCCURRED	REMARKS
Gas Cylinder Plug	44577R	1,643	Plug came out while firing.
Gas Cylinder Plug	55066R	506	Plug came out while firing.

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CHART 16-32

M60-MG-- BROKEN, DAMAGED, AND LOST PARTS TO WHICH MALFUNCTIONS  
WERE NOT ATTRIBUTED

PART	WEAPON SER NO	NO RDS WHEN OCCURRED	REMARKS
Operating Rod	58592R	4,919	Yoke cracked--noted during cleaning
Bolt	58592R	4,919	Bolt locking lug badly chipped-- noticed during cleaning
Shoulder Gun Stock Assembly	56236R	7,309	Stock broken when dropped
Bolt Plug Lock Pin	51869R	606	Lost--discovered during cleaning
Bolt Plug Lock Pin	58716R	2,608	Lost--discovered during cleaning
Firing Pin	58716R	2,608	Broken--discovered during cleaning

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CHART 16-33

CODE S-MG--BROKEN, DAMAGED, AND LOST PARTS TO WHICH  
MALFUNCTIONS WERE ATTRIBUTED

PART	WEAPON SER NO	NO RDS WHEN OCCURRED	REMARKS
Trigger Pin	000540	872 &	
Trigger Pin	000540	961	Pin vibrated loose during firing
Trigger Housing Cover Pin	000545	306 &	
Trigger Housing Cover Pin	000545	976	Pin vibrated loose during firing
Feed Cover Assembly Pin	000610	15	Pin vibrated loose during firing
Feed Cover Assembly Pin	000580	2,152	Pin vibrated loose during firing
Feed Tray Assembly Screws	000579	644	Screws vibrated loose during firing
Lock Plate	000568	479	Came loose during firing
Bolt	000611	3,665	Broken during firing
Bolt	000550	6,833	Broken during firing
Bolt	000564	7,456	Broken during firing
Bolt	000563	2,997	Broken during firing
Carrier and Piston Assembly	000611	2,498	Piston separated from carrier during firing
Carrier and Piston Assembly	000585	2,031	Piston separated from carrier during firing
Ruptured Cartridge	000544	---	Occurred on 5570, 6552, 6652, 6912, 6952, 7162, and 7261 rds - bolt badly worn (fig )
Ruptured Cartridge	000611	2521 & 3139	---
Drive Flange Tension Spring	000564	7,800	Spring broke during firing
Barrel Assembly	000560	4,559	Hole discovered in front sight mount forward of barrel bushing-- weapon fired single shot only for 6 rounds

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CHART 16-34

CODE S-MG--BROKEN AND LOST PARTS TO WHICH  
MALFUNCTIONS WERE NOT ATTRIBUTED

PARTS	WEAPON SER. NO	NO RDS WHEN OCCURRED	REMARKS
Bolt	000540	7,423	--discovered during cleaning
Barrel Bushings Rings	000557	1,343	Rings discovered bent and broken during cleaning
Drive Spring Guide Rod	000567	2,601	Broken--discovered during disassembly
Windage Knob	000604	2,236	Broken--discovered during inspecti
Windage Knob	000605	3,421	Bent during jumping
Front Sight	000605	N/A	Loose and bent, discovered during cleaning
Feed Cover Assembly	000605	N/A	Bent during jumping
Feed Cover Latch Handle	000605	N/A	Bent during jumping
Feed Cover Latch	000568	765	Disassembled while feed cover was being opened
Feed Cover Latch	000548	738	Disassembled while feed cover was being opened
Feed Plate Screw	000550	3,772	Missing--discovered during disassembly
Pivot Pin Nut	000583	8,513	Broken--discovered during disassembly
Carrier Cap Rollers	000610	6,387	Disassembled-- discovered during cleaning
Lock Plate Guide Pin	000568	1,153	Bent--discovered during cleaning
Trigger Guard	000577	966	Lost during night assault
Sear and Sear Pin	000544	8.863	Broken--discovered during inspection

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CHART 16-35

RECORDED NUMBER OF ROUNDS ON MACHING GUN BARRELS

M60				CODE S			
WEAPON NUMBER	BARREL #1	BARREL #2	TOTAL	WEAPON NUMBER	BARREL #1	BARREL #2	TOTAL
58592R	5,319	1,062	6,381	000540	2,362	2,905	5,267
55066R	1,107	211	1,318	000543	1,252	281	1,533
56236R	4,680	246	4,926	000575	2,032	282	2,314
56269R	4,003	2,438	6,441	000569	2,889	3,393	6,282
55017R	2,004	246	2,250	000545	2,219	360	2,579
55228R	3,644	1,862	5,506	000580	4,287	4,084	8,371
55873R	1,512	517	2,029	000539	4,535	5,079	9,614
55554R	4,632	1,068	5,700	000604	1,552	280	1,832
52012R	1,427	478	1,905	000557	561	3,057	3,618
51869R	4,909	2,389	7,298	000605	1,139	3,278	4,417
54540R	5,827	2,252	8,079	000567	3,952	6,410	10,362
55733R	1,381	-----	1,381	000544	4,963	4,914	9,877
55132R	5,298	3,270	8,568	000583	6,017	2,449	8,466
55390R	2,412	604	3,016	000579	1,871	2,779	4,650
56216R	5,876	3,236	9,112	000610	1,672	917	2,589
55879R	2,072	436	2,508	000560	2,189	431	2,620
55613R	2,361	-----	2,361	000568	3,078	5,483	8,561
55007R	4,725	2,042	6,767	000551	1,348	846	2,194
55334R	2,041	686	2,727	000552	4,269	5,321	9,590
54577R	1,833	577	2,410	000611	1,179	360	1,539
44823R	5,803	2,036	7,839	000576	994	59	1,053
55131R	2,658	968	3,626	000585	1,943	-----	1,943
55503R	1,659	681	2,340	000591	-----	-----	-----
55758R	3,808	1,868	5,676	000550	4,675	2,764	7,439
58716R	2,353	751	3,104	000548	1,465	50	1,515
-----	-----	-----	-----	000564	5,301	2,638	7,939
-----	-----	-----	-----	000577	1,131	406	1,537
-----	-----	-----	-----	000563	1,866	2,836	4,702
TOTAL	83,344	29,924	113,268		70,741	61,662	132,403

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## APPENDIX III -- FINDINGS -- PART I

### CHARACTERISTICS AND STANDARDS, SMALL ARMS WEAPONS SYSTEMS (SAWS) PROGRAM

#### Characteristics and Standards\*

#### Determined by:

"1. (C) GENERAL: These characteristics will be used to evaluate all candidate rifle, carbine, submachine guns and automatic rifles, deleting those characteristics where they are not applicable; (e.g., delete delivery of area fire munitions and use of bipod for carbine and submachinegun role). However, testing should permit the evaluation and comparison of the capabilities of each candidate carbine/submachinegun to fill the rifle and automatic rifle role and of the candidate rifles to fill the carbine/submachinegun role.

"2. (C) VERSATILITY: Determine capability of delivering selectively, both semiautomatic, full automatic and controlled burst automatic point-type munitions and area-type munitions from a multishot, semiautomatic grenade launcher; independent use as a lightweight rifle, separately from the area-fire portion of the weapon; accepting a folding-type bipod for use in the full automatic mode; minimizing length by substituting a stock group that folds or slides forward, for use in those roles in which compactness is essential; and maximum commonality of internal functional parts and ammunition with other weapons of the small arms weapons family. Determine each candidate weapon's capability to perform any or all of these roles.

#### Sub-Test No

\*\*R - 1

C - 1

A - 1

\* USAIB Responsibilities underlined

\*\* R - Rifles

C - Carbines

A - Automatic Rifles

Group 4 (downgraded at 3 year intervals)

Declassified After 12 Years

DOD Dir 5200.10)

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## Characteristics and Standards

## Determined by:

"3. (C) PHYSICAL CHARACTERISTICS:  
(Evaluate the following).

### a. Configuration and Design:

(1) Simplicity in design and constructions: Maximum permitted by other required characteristics.

Sub-Test No  
R - 1  
C - 1  
A - 1

(2) Weight: Minimum permitted by other required characteristics.

Sub-Test No  
R - 1  
C - 1  
A - 1

(3) Length: Minimum permitted by other required characteristics, but not so short as to prohibit three-point support (chest and elbows) when firer is in the prone position.

Sub-Test No  
R - 1  
C - 1, 19  
A - 1, 19

(4) Safety(s): Easily identifiable, conveniently located, positive safety(s), to prevent accidental firing and dangerous malfunctions, designed so that safe fire position can be determined by touch and operation of safety(s) is inaudible.

Sub-Test No  
R - 18  
C - 18  
A - 18

(5) Sights: Simple and durable integral sight(s) having positive settings and appropriate visual scales for determining 'zero' and not requiring use of special tools for adjustment. For employment of point-type munitions, determine accuracy of sights out to 600 meters and additional range settings for ranges out to 1000 meters or the maximum effective range of the weapon. For employment of area-type munitions, determine accuracy of sights in range graduations from 50 out to 550 meters against both stationary and moving targets. Determine inherent capability to align on the target at night and other conditions of limited visibility (to include artificial illumination)

Sub-Test No  
R - 4  
C - 4  
A - 4

Sub-Test No  
R - 4  
C - 4  
A - 4

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## Characteristics and Standards

Determined by:

provided the target can be detected with the unaided eye. Evaluate performance with night sighting devices such as: Individual Night Vision Weaponsight; Infrared and Collimated Sights and use of TIARA.

(6) Magazine Ammunition Capacity:  
Maximum permitted by other required characteristics. Determine suitability of magazines with minimum of 50 rounds point-fire ammunition and three rounds of area-type ammunition. Evaluate suitability of magazines of lesser and greater capacities and use of factory packed, expendable (discardable) magazines. Determine capability of loading the weapon (insertion of magazine) in one operation (from all firing positions) and re-charging the magazine by use of a multi-round charging device.

Sub-Test No  
R - 5  
C - 5  
A - 5

Sub-Test No  
R - 5  
C - 5  
A - 5

(7) Bayonet: The weapon's capability of accepting a bayonet without building additional strength into the weapon primarily to fulfill the bayonet fighting capability. Determine capability to fire point and area munitions safely with the bayonet attached. Evaluate possible bayonet designs and methods of attachment to weapon to reduce weight, bulk and effects on accuracy.

Sub-Test No  
R - 1  
C - 1  
A - 1

(8) Folding Type Bipod:  
Lightweight and readily detachable. Capable of attachment to that portion of the weapon which most improves stability and least compromises accuracy. Determine effects on accuracy when firing from the bipod in all modes of fire (semi-automatic, full automatic and controlled burst) at representative ranges out to 1000 meters.

Sub-Test No  
R - 1, 14  
A - 1, 14  
C - 1, 14

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## Characteristics and Standards

## Determined by:

(9) Hinged Butt Plate:  
Determine necessity to improve performance.

### b. Human Engineering Characteristics.

(1) Size and Shape:  
Determine capability of being fired from either the right or left shoulder in all normal firing positions by all military personnel meeting physical requirements of Department of the Army. Evaluate the suitable stock designs to include use of pistol grip and adjustable stock lengths to accommodate firers of various physical conformation and improve weapon effectiveness.

#### Sub-Test No

R - 19

C - 19

A - 19

(a) Determine the effects of weapon configuration on aiming error (at representative ranges, and all positions and modes of fire) and hit probabilities for both aimed and un-aimed or pointed fire.

(b) Determine capability to fire while wearing complete Arctic clothing and CB protective mask and clothing.

#### Sub-Test No

R - 19

C - 19

A - 19

(2) Safetys, Controls, Sights:  
Minimum number and designed so that they are easily located and identified by touch and operated with minimum of motion by the firer (in all firing positions) to include while under extremes of weather and wearing complete Arctic clothing and CB protective clothing.

#### Sub-Test No

R - 19

C - 19

A - 19

(3) Recoil: Minimum to permit shoulder and hip firing point-fire and shoulder firing of area-fire without undue discomfort to the firer. Evaluate the use of recoil padding or other recoil absorbing mechanisms.

#### Sub-Test No

R - 19

C - 19

A - 19

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## Characteristics and Standards

(4) Blast and Noise: Determine undue discomfort to the firer, effects on accuracy and evaluate against maximum level precluding injury.

(5) Ejection Pattern: Determine interference with adjacent firers or the firer's ability to aim and fire accurately from any position. Evaluate the effects of gases or other matter being expelled from the weapon chamber during firing.

(6) Portability/Aerial Delivery: Determine relative comfort to carry and fire, to include projections which can readily entangle in brush, grass or battlefield obstacles. Evaluate suitability of accepting or carrying sling in a conventional manner. Determine suitability of being carried while debarking from amphibious shipping via cargo nets; getting in and out of aircraft, vehicles and APC's; by parachutists during descent and of weapons and ammunition being dropped from aircraft by standard means of aerial delivery.

(7) Pointing Characteristics: Evaluate configuration, sight design and balance of the weapon as they affect pointing characteristics.

(8) Heat: Determine effects on firer, weapon's performance and safety caused by rapid or sustained firing, heat transfer from area-fire or point-fire portion of the weapon and absorption from exposure to the sun.

"4. (C) PERFORMANCE & EFFECTIVENESS  
(Weapon and Ammunition Combination).

a. Performance (Employment of Point-Type Fire).

## Determined by:

Sub-Test No  
R - 19  
C - 19  
A - 19

Sub-Test No  
R - 19  
C - 19  
A - 19

Sub-Test No  
R - 13  
C - 13  
A - 13

Sub-Test No  
R - 19  
C - 19  
A - 19

Sub-Test No  
R - 19  
C - 19  
A - 19

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## Characteristics and Standards

Determined by:

(1) Modes of Fire: Determine capability of delivering selectively semiautomatic, full automatic and controlled burst automatic fire and provision of a tamper-proof means to render the automatic fire and/or controlled burst group mechanism inoperative. Evaluate the feasibility and suitability of incorporating these features into the weapon design.

(2) Rate of Fire: Determine effect of full automatic mode cyclic rate of fire on accuracy and ability of firer to control the size of his bursts when firing with or without a bipod. Determine if cyclic rate of fire in the controlled burst automatic mode is adjusted for the optimum rate of attaining the highest hit probability. Determine the relative effectiveness of the burst in the full automatic mode and rapid firing of controlled bursts in the controlled burst automatic mode. Determine the usable rates of fire in terms of effectiveness, controllable size of bursts in the full automatic mode and the maximum rate and duration of fire without damage to the weapon, degrading its performance or safety to the firer.

b. Effectiveness (Employment of Point Fire).

(1) Accuracy: Determine with each available type of ammunition:

(a) Semiautomatic: From a bench rest, the linear standard deviation and mean radius of a 10 round shot group fired at representative ranges out to 1000 meters; from the prone position, the percentage of rounds striking within an area 20" X 20" on a vertical target at representative ranges out to 1000 meters.

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## Characteristics and Standards

Determined by:

(b) Full Automatic (With Firer Controlling Number of Rounds per Burst): From the prone position, with and without bipod, \*\*\*dispersion and the percentage of rounds striking within an area  $3\frac{1}{2}'$  high by 5' wide on a vertical target at representative ranges out to 1000 meters; from the standing position (without rest) \*\*\*dispersion and the percentage of rounds striking within an area of 30" by 40" on a vertical target at representative ranges out to 150 meters.

(c) Controlled Burst:  
From the prone position, the \*\*\* extreme spread of each controlled burst group at representative ranges out to 1000 meters; from the prone position, with and without a bipod, the percentage of rounds striking within an area 20" X 20" on a vertical target at representative ranges out to 1000 meters.

(d) Brush Penetration:  
Determine the effects of brush penetration.

(e) Adverse Conditions:  
Determine the effects of weather (rain, snow, wind) and temperature.

(2) Lethality: Determine, for each type projectile (to include tracer), the lethality against personnel protected by standard body armor and standard helmets with liners, and unprotected personnel at representative ranges between 25 meters and 1000 meters in terms of 30 seconds assault and 30 seconds defense partial and 100% incapacitation criteria as defined in CRDL Report 3204; lethality of ricochet projectiles at same ranges; effects of climatic conditions to include temperature extremes.

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## Characteristics and Standards

## Determined by:

(3) Penetration: Determine, for each type projectile (to include tracer), the penetration capability at representative ranges between 25 and 1000 meters against body armor, helmets with liners, rolled homogeneous steel and aluminum armor, and normal battlefield materials such as wood, sand, brick, concrete, snow, ice and brush to include lethality capability remaining after penetration. Determine the relative effectiveness of each type projectile against hard targets such as unarmored vehicles, aircraft, concrete, logs, and sandbags. Determine cumulative penetration effects (erosion) of concrete, logs and sandbags against time.

(4) Tracer Capability: Determine ballistic match with other type projectiles; initiation and termination of trace:

(a) Visibility under all light conditions.

Sub-Test No

R - 6

C - 6

A - 6

(b) Compatibility with night sighting devices.

R - 6

C - 6

A - 6

(c) Relative effectiveness as a means of target ranging and target/sector of fire designation and engagement of moving ground and aerial targets at all ranges out to 1000 meters

R - 6

C - 6

A - 6

(d) Night tracer muzzle obscuration effects on the shooter and adjacent firers, and the number of tracer rounds required per controlled burst and full automatic firer controlled burst to produce most effective results.

R - 6

C - 6

A - 6

(e) Determine the relative hit probability with and without tracer (both day and night).

R - 6

C - 6

A - 6

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## Characteristics and Standards

Determined by:

(5) Trajectory: Determine maximum ordinate at all ranges up to 1000 meters. Evaluate ordinate in terms of a single sight setting for a spread of ranges (battle sights), ricochet effectiveness, hit potential on targets in depth and engagement of slow-flying aerial targets.

(6) Hit Potential: Determine relative accuracy and effectiveness of each weapon against the following types of target situations:

(a) Quick fire at the shorter ranges (25-150) using both pointed and aimed fire techniques, time to fire first round and second round on same target and time to engage a second target.

Sub-Test No  
R - 12  
C - 12  
A - 12

(b) Day and night assault.

R - 8  
C - 8  
A - 8

(c) Day and night defense; targets in tactical disposition (concealed and in emplacements) at all ranges out to 1000 meters; effects against targets behind brush.

R - 7  
C - 7  
A - 7

(d) Effectiveness of area or suppressive fire at the longer ranges 600-1000 meters; and engagement of stationary and moving targets both ground and air (low, slow-flying aircraft), out to ranges of 1000 meters. Determine effectiveness in terms of hits per rounds fired, pounds of ammunition/weapon, trigger pulls, unit of time, modes of fire, rates of fire.

R - 7  
C - 7  
A - 7

(e) Types ammunition used.

R - 7  
C - 7  
A - 6 and 7

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## Characteristics and Standards

(f) Evaluate the effects of 'feed back' fire adjustment information from bullet strike in the target area. Evaluate the functions and time required to switch from the engagement of a target with point-ammunition to engagement with area ammunition.

c. Performance (Employment of Area-Fire).

(1) Modes of Fire: Determine semiautomatic, multishot grenade launching capability.

(2) Rates of Fire: Determine maximum rates of aimed fire against a single target and multiple targets at all usable ranges. Determine maximum rate and duration of fire without damage to the weapon, degrading its performance or safety of the firer.

d. Effectiveness (Employment of Area-Fire).

(1) Accuracy: Determine, with aimed fire from all appropriate positions, accuracy of all types of rounds/grenades against horizontal ground targets at representative ranges out to 600 meters and vertical targets out to 300 meters. Determine effects of weather and temperature on accuracy.

(2) Lethality: Determine, for antipersonnel type munitions/grenades, the fragmentation pattern and lethal area in terms of 30 seconds assault and 30 seconds defense partial and 100% incapacitation criteria against exposed personnel and exposed personnel protected by body armor and helmets with liners. Determine the degradation in fragmentation pattern and lethal area caused by impacting in snow, mud, water and foliage.

## Determined by:

Sub-Test No

R - 7

C - 7

A - 7

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## Characteristics and Standards

Determined by:

(3) Penetration: Determine, for antimateriel type munitions/grenades, the penetration capability, to include spalling effects, against armored, lightly armored and unarmored vehicles and normal battlefield material such as logs, sandbags, brick and concrete.

(4) Tracer Capability: (N/A).

(5) Trajectory: Determine maximum ordinate for all types munitions/grenades at all ranges out to maximum range.

(6) Hit Potential: Determine at representative ranges out to the maximum range of the weapon/ammunition the relative accuracy and effectiveness of each type munitions/grenades against the following types of targets; targets representing grouped personnel; tactically deployed rifle squad; crew-served weapons in the open and emplaced in hasty field fortifications; windows and vehicles both stationary and moving. Evaluate the relative ability to place a high volume of fire on a target and to engage two or more targets in rapid succession, to include situations where both point and area type fire will be used to engage a series of targets against time. Determine effectiveness in terms of hits per rounds fired, pounds (weapon/ammunition), unit of time, mode of fire and rate of fire.

(7) Other: Determine capability to launch signalling smoke and illuminating munitions.

"5. (C) DURABILITY AND RELIABILITY CHARACTERISTICS - Determine the following:

a. Resistance to deleterious effects of fungus, sand, salt water, rust and corrosion during use and storage.

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## Characteristics and Standards

## Determined by:

b. Functioning under all adverse conditions, to include rain, snow, salt water, dust and mud after submersion, and at temperature extremes as stated in AR 705-15, 'Operation of Materiel Under Extreme Conditions of Environment.'

c. Barrel life without accuracy degradation of more than ten percent.

d. Malfunctions (to include failures to feed or fire) in terms of number of rounds fired and categorized as: clearable by immediate action; requiring parts replacement or correction by echelons higher than the individual using the weapon.

### Sub-Test No

R - 16

C - 16

A - 16

e. Ruggedness: Capability to withstand normal usage encountered in training and combat and of functioning for long periods without cleaning or lubrication.

### Sub-Test No

R - 16

C - 16

A - 16

## "6. (C) OPERATIONAL SUITABILITY (Evaluate).

a. Firer exposure as a result of weapon configuration when firing point and area type munitions from prone or foxhole positions.

### Sub-Test No

R - 11

C - 11

A - 11

b. Signature effects (smoke, flash, blast, reflections, etc.), of the weapon (point and area) when firing all types of ammunition under day/night, hot/cold and wet/dry conditions.

### Sub-Test No

R - 11

C - 11

A - 11

c. Safety restriction imposed on the employment of the weapon by such features as noise, blast, discarding sabots, safe arming distance and lethal radius of bursting grenades.

### Sub-Test No

R - 18

C - 18

A - 18

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## Characteristics and Standards

## Determined by:

d. Versatility of weapon design:  
In terms of modes of fire, commonality  
of parts with other platoon weapons  
and use of point and area fire.

Sub-Test No  
R - 17  
C - 17  
A - 17

e. 'Soldier Proof' features such  
as tamper-proof controls, reversed  
assembly, firing without cleaning or  
lubricating, use of improper cleaning  
materials (gas, diesel fuel, etc.) and  
ruggedness (driving tent pegs, breaking  
window sashes, etc.).

Sub-Test No  
R - 15  
C - 15  
A - 15

"7. (C) MAINTENANCE CHARACTERISTICS.  
Evaluate the following:

a. Ease of assembly and disassembly  
and tools required.

Sub-Test No  
R - 15  
C - 15  
A - 15

b. Ease of maintenance under combat  
conditions to include cleaning and mainte-  
nance tools/equipment to be provided as  
Basic Issue Items.

Sub-Test No  
R - 15  
C - 15  
A - 15

c. Design which precludes reversed  
assembly to the detriment of its functioning  
(to include barrel change if appropriate).

Sub-Test No  
R - 15  
C - 15  
A - 15

"8. (C) SPECIAL CHARACTERISTICS TO BE  
DETERMINED DURING ET/ST AS AN ASSIST TO  
LATER SUB TESTS.

a. Best firing positions and techniques  
of fire.

Sub-Test No  
R - 2  
C - 2  
A - 2

b. Assembly/disassembly and  
maintenance techniques.

Sub-Test No  
R - 15  
C - 15  
A - 15

c. Safety restrictions or precautions.

Sub-Test No  
R - 18  
C - 18  
A - 18

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Characteristics and Standards

d. Sight settings or adjustments to achieve best accuracy results.

e. Most effective number of rounds in firer controlled burst.

"9. (C) TRAINING AIDS: Determine availability and suitability of training aids such as blank ammunition and blank firing attachments/devices, weapon instructional manuals and compatibility with current standard marksmanship training aids."

Determined by:

Sub-Test No

R - 4

C - 4

A - 4

Sub-Test No

R - 3

C - 3

A - 3

Sub-Test No

R - 2, 14

C - 2, 14

A - 2, 14

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## APPENDIX III, PART II

### Characteristics and Standards

Determined by:

"1. (C) GENERAL: These characteristics and standards will be used to evaluate all candidate machine guns. Separate characteristics and standards for machine guns in the ground, aircraft mounted and combat vehicle mounted roles have been developed to facilitate testing at separate locations. However, each candidate machine gun will be evaluated to determine its capability to perform in all roles. Additionally, the ground machine guns should be evaluated to determine their capability to perform in the squad automatic rifle role.

"2. (C) VERSATILITY: Candidate weapons will be evaluated to determine capability to be used as a hand-carried weapon fired from supported and unsupported positions, ground mounted on a sustained fire mount, and as a fixed or semi-fixed machine gun mounted on selected combat wheeled vehicles, tracked vehicles, tanks and aircraft. Determine maximum commonality of parts, ammunition and ammunition packaging with other weapons of the small arms weapons family.

Sub-Tests No 9 and 17

\* \* \* \* \*

"1. (C) PHYSICAL CHARACTERISTICS  
(Evaluate the following):

a. Configuration and Design:

(1) Simplicity in Design and Construction: Maximum permitted by other required characteristics.

Sub-Test No 1

(2) Weight: Minimum permitted by other required characteristics (weapon and mount).

Sub-Test No 1

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## Characteristics and Standards

(3) Length: Minimum permitted by other required characteristics.

(4) Safety(s): Easily identifiable, conveniently located, positive manual safety that can be identified by touch and is inaudible when operated. Determine if integral safety features incorporated into the design of the weapon will preclude inadvertent firing and malfunctioning of the weapon.

(5) Sight: Simple, durable and integral sight having positive settings and appropriate visual scale for determining zero and not requiring special tools for adjustment. Determine the accuracy of the sights when set on indexed range for ranges out to 1500 meters. Determine the inherent capability to align on the target during all conditions of limited visibility (to include artificial illumination) provided the target can be detected with the unaided eye. Evaluate performance of the weapon with night sighting devices such as Individual Night Vision Weaponsight; Infrared, TIARA and Collimated Sight.

(6) Ammunition Capacity: Capacity, size, shape and functioning of ammunition containers when firing from bipod, sustained fire mount and from hip-shoulder firing positions. Evaluate ease of loading, feeding, unloading, and joining additional ammunition belts. Evaluate means provided for recharging magazines if appropriate.

(7) Bipod: Determine if bipod is lightweight, durable, attachable and detachable and is attached to that part of the weapon that least compromises accuracy and most improves stability.

## Determined by:

Sub-Test No 1

Sub-Test No 18

Sub-Test No 4

Sub-Test No 6

Sub-Test No 1

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## Characteristics and Standards

Determined by:

(8) Barrel Change: Provision for quick and efficient barrel change with fixed headspace and without loss of accuracy.

Sub-Test No 4.

(9) Shoulder Stock: Configuration, lightweight and ruggedness.

Sub-Test No 1

(10) Sustained Fire Mount: Sustained fire mount for provision of maximum free horizontal and vertical movement, controlled horizontal and vertical movement and the traversing and elevating mechanism for minimum free play.

Sub-Test No 9

### b. Human Engineering Characteristics.

(1) Size and Shape: Determine capability of being fired from the bipod (from the left or right shoulder) and sustained fire mount by all personnel meeting physical requirements of Department of the Army. Determine capability to fire while wearing complete arctic clothing and CB protective mask and clothing.

Sub-Test No 19

(2) Safetys, Controls, Sights: Minimum number and designed so that they are easily located and identified by touch and operated with a minimum of motion by the firer (in all firing positions) to include under extremes of weather and wearing complete arctic clothing and CB protective clothing.

Sub-Test No 19

(3) Recoil: Minimum to permit shoulder, underarm or hip firing without undue discomfort to the firer. Evaluate use of recoil padding or other recoil absorbing mechanisms.

Sub-Test No 19

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## Characteristics and Standards

(4) Blast and Noise: Determine undue discomfort to the firer/crew, effects on accuracy and evaluate against maximum level precluding injury.

Determined by:

Sub-Test No 19

(5) Ejection Pattern: Determine interference with adjacent firers on the firer's ability to aim and fire accurately from any position. Evaluate the effects of gasses or other matter being expelled from the chamber during firing.

Sub-Test No 19

(6) Portability/Aerial Delivery: Determine relative ease to carry and fire to include a minimum of projections which could entangle in battlefield obstacles. Determine capability of weapon and mount being jumped by one man and complete system being aerial delivered. Determine suitability of weapon and ammunition containers being carried while debarking from amphibious shipping via cargo nets, getting in and out of aircraft, vehicles and APC's. Evaluate suitability of accepting a carrying sling.

Sub-Test No 13

(7) Pointing Characteristics: Configuration, sight design and balance of the weapon as they affect pointing characteristics.

Sub-Test No 19

(8) Heat: Determine effects on firer, weapon's performance and safety caused by rapid or sustained fire and exposure to the sun.

Sub-Test No 19

"2. (C) PERFORMANCE AND EFFECTIVENESS.  
(Weapon and Ammunition Combination)

a. Performance

Rate of Fire: Evaluate cyclic rate of fire in terms of

Sub-Test No 3

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## Characteristics and Standards

Determined by:

effectiveness and ability of firer to control the number of rounds in the burst to commensurate with the target coverage and conservation of ammunition. Determine maximum rate and duration of fire without damage to the weapon, degrading its performance, or safety hazard to the firer. Evaluate suitability of incorporating a mechanical burst control mechanism.

### b. Effectiveness

(1) Accuracy: Determine, with each type ammunition available:

\* \* \* \* \*

(b) Automatic from bipod and tripod - In six to nine round bursts, the percent of rounds striking within an area 5' x 10' on a vertical intercept and the round to round projectile dispersion at representative ranges to 1500 meters.

(c) Automatic from standing positions (shoulder, under-arm and hip) - Percent of rounds striking within an area 30" x 40" on a vertical intercept at representative ranges out to 150 meters.

(d) Brush penetration - Effects on brush penetration.

(e) Adverse conditions - Effects of weather (rain, snow, wind) and temperature.

(2) Lethality: Determine, for each type projectile, the lethality against personnel protected by standard body armor and steel helmet with liner, and unprotected personnel

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## Characteristics and Standards

Determined by:

at representative ranges out to 1500 meters in terms of 30 seconds assault and 30 seconds defense partial and 100% incapacitation criteria as defined in CRDL Report 3204. Determine lethality of ricochet projectiles at the same ranges and effects of climatic conditions to include temperature extremes.

(3) Penetration: Determine, for each type projectile, the penetration capability at representative ranges out to 1500 meters against standard body armor, steel helmet with liner, rolled homogeneous steel and aluminum armor and battle-field materials such as snow, ice, logs, concrete, bricks, brush, and sandbags to include lethality after penetration. Determine relative effectiveness of each type projectile against hard targets such as unarmored vehicles, low, slow-flying aircraft, concrete, logs and sandbags. Determine cumulative penetration effects (erosion) of concrete, logs, and sandbags against time.

(4) Tracer Capability: Determine ballistic match with other type projectiles; initiation and termination of trace, visibility under all light conditions; compatibility with night sighting devices; relative effectiveness as a means of target ranging and engagement of moving ground and aerial targets at all ranges out to 1500 meters; night tracer muzzle obscuration effects on firer and adjacent firers; and the number of tracer rounds required per firer controlled burst to produce most effective results. Determine the relative hit probability with and without tracer (both day and night).

Sub-Test No 6

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## Characteristics and Standards

Determined by:

(5) Trajectory: Determine the maximum ordinate at all ranges out to 1500 meters. Evaluate ordinate in terms of a single sight setting for a spread of ranges (battle sight), ricochet effectiveness, hit potential on targets in depth and engagement of low, slow-flying aerial targets.

(6) Hit Potential: Determine relative effectiveness and accuracy of the machine gun against the following types of target situations: Quick fire type targets at the shorter ranges (25-150 meters) using both pointed and hip fire techniques; day and night assault; day and night defense and targets in tactical disposition (concealed and in emplacements) at ranges out to 1500 meters. Determine effectiveness against targets behind brush; area suppressive fires at the longer ranges; and the engagement of moving ground and low, slow-flying aerial targets at ranges out to 1500 meters. Evaluate the effects of 'feed back' fire adjustment information from bullet strike in the target area. Determine effectiveness with each type of ammunition (ball, tracer, AP, and duplex) and mixes of ammunition in terms of hits per rounds fired, pounds of ammunition/weapon and unit of time.

Sub-Tests No 6, 7, 8, and 10

"4. (C) DURABILITY AND RELIABILITY CHARACTERISTICS: Determine the following:

a. Resistance to Deleterious Effects of fungus, sand, salt water, rust and corrosion during use and storage.

b. Functioning Under All Adverse Conditions, to include rain, snow, salt water, dust and mud after submersion, and at temperature extremes as stated in AR 705-15, 'Operation of Materiel Under Extreme Conditions of Environment.'

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## Characteristics and Standards

## Determined by:

c. Barrel Life without accuracy degradation of more than 10 percent.

Sub-Test No 16

d. Malfunctions (to include failure to feed or fire) in terms of number of rounds fired and categorized as: clearable by immediate action; requiring parts replacement or correction by echelons higher than the individual using the weapon.

e. Ruggedness: Capability to withstand normal usage encountered in training and combat and of functioning for long periods without cleaning or lubrication.

Sub-Test No 16

## "5. (C) OPERATIONAL SUITABILITY (Evaluate).

a. Firer Exposure as a result of weapon configuration when firing from bipod and tripod from prone or gun emplacement positions.

Sub-Test No 11

b. Signature Effects (smoke, flash, blast, reflection, etc.) of the weapon when firing all types of ammunition under day/night, hot/cold and wet/dry conditions.

Sub-Test No 11

c. Safety Restrictions imposed on the employment of the weapon by such features as blast, noise, flash, ammunition residue and overhead fire.

Sub-Test No 18

d. Versatility of Weapon Design: In terms of use with bipod, tripod, vehicle and aircraft mounts, and commonality of parts with other platoon weapons.

Sub-Test No 17

e. 'Soldier Proof' features such as tamper-proof controls, reversed assembly, firing without cleaning or lubrication, use of improper cleaning materials (gas, diesel fuel, etc.) and ruggedness.

Sub-Test No 15

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## Characteristics and Standards

Determined by:

"6. (C) MAINTENANCE CHARACTERISTICS.  
Evaluate the following:

a. Ease of Assembly and dis-  
assembly and tools required.

Sub-Test No 15

b. Ease of Maintenance under  
combat conditions.

Sub-Test No 15

c. Design which precludes re-  
versed assembly to the detriment of  
its functioning.

Sub-Test No 15

"7. (C) SPECIAL CHARACTERISTICS TO  
BE DETERMINED DURING ET/ST AS AN  
ASSIST TO LATER SUB TESTS:

a. Best firing positions,  
techniques of fire and size of crew.

Sub-Test No 2

b. Assembly/disassembly and  
maintenance techniques.

Sub-Test No 15

c. Safety restrictions or pre-  
cautions.

Sub-Test No 18

d. Sight settings or adjustment  
to achieve best accuracy results.

Sub-Test No 4

e. Performance as aircraft door  
mounted weapon.

f. Most effective number of  
rounds in firer controlled burst.

Sub-Test No 3

g. Determine suitability of  
mounting the weapons on selected  
wheel and tracked vehicles to include  
APC's.

Sub-Test No 9

"8. (C) TRAINING AIDS: Determine  
availability and suitability of  
training aids such as blank ammunition  
and blank firing attachments/devices,  
weapon instructional manuals and  
compatibility with current standard  
marksmanship training aids."

Sub-Tests No 2 and 6

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## APPENDIX IV - DEFICIENCIES AND SHORTCOMINGS

### 1. DEFICIENCIES

<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-R	Lack of a multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.
	The reversibility of the tang on the carrier cap assembly (S/T 15).	Stamp side of bolt carrier with an R and arrow on one side and MG and arrow on other side to indicate direction of cap for each configuration.	Firers assembled rifle with the tang on the carrier cap assembly reversed.
	The reversibility of the hammer spring (S/T 15).	Unknown.	Firers assembled rifle with the hammer spring reversed.
	Excessive number of cracked or broken bolts (S/T 16).	Use harder steel.	Six bolts failed.
	Separation of the bolt carrier and piston assembly (S/T 16).	Use a more reliable solder.	Three pistons separated from the bolt carrier.
	Safety restrictions limit the use of the rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired in a rifle before cooling.
XM16E1	Lack of a multiround charging device, which was not furnished with weapon. (S/T 5).	Develop a multiround charging device.	Multiround charging device was not provided with magazine or ammunition.

Group 4 (downgraded at 3 year intervals)  
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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
XM16E1	Bolt carrier key became loose and required re-torqueing (S/T 16).	Improve quality control.	Four bolt carrier keys loosened from the bolt carrier.
	Excessive number of cracked or broken bolts (S/T 16).	Use harder steel.	Four bolts failed.
	Excessive number of broken firing pin retaining pins (S/T 16).	Use harder steel.	Twenty-four firing pin retaining pins failed.
H-R	Lack of multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.
	Excessive number of incidents of binding of the operating rod pin on the operating tube (S/T 16).	Closer tolerance for the operating rod pin.	Firers noted the operating rod binding in the operating tube. Examination showed protrusion by the operating rod pin.
	Safety restrictions limit the use of the rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired in a rifle before cooling.
A-R	Lack of a multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
A-R	Broken guide rod weld assemblies (S/T 16).	Make a more durable weld.	Five guide rod weld assemblies failed. The assembly was modified; however, one guide rod weld assembly failed thereafter.
	Cracked lower receivers in the magazine housing and in the weld on the butt plate (S/T 16).	Increase the strength of the welds.	Eight lower receivers failed.
	Bolt carriers burred, preventing removal of the firing pin (S/T 16).	Make bolt carriers of a harder steel.	One bolt carrier was burred, preventing removal of the firing pin.
	Cracked upper receiver pivot (S/T 16).	Increase strength of pivot.	One upper receiver pivot failed.
	Cracked barrel extension. (S/T 16).	Increase thickness of barrel extension.	One barrel extension cracked.
	Safety restrictions limit the use of the rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired on a rifle before cooling.
S-C	Lack of a multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-C	The reversibility of the tang on the carrier cap assembly (S/T 15).	Stamp side of bolt carrier with an R and arrow on one side and MG and arrow on the other side to indicate direction of cap for each configuration.	Firers assembled rifle with the tang on the carrier cap assembly reversed.
	The reversibility of the hammer spring (S/T 15).	Unknown.	Firers assembled rifle with the hammer spring reversed.
	Cracked or broken bolts (S/T 16).	Use harder steel.	Two bolts failed.
	Separation of the bolt carrier and piston assembly (S/T 16).	Use a more reliable solder.	One piston separated from bolt carrier.
	Safety restrictions limit the use of the rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired before cooling.
C-SMG	Lack of multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.
	Excessive muzzle flash with ball and tracer ammunition (S/T 6, S/T 11).	Design a flash suppressor and use ammunition with CR propellant.	Muzzle flash blinded firers at night and could be seen readily in daylight.
	Excessive noise (S/T 11).	Design a noise suppressor and use ammunition with CR propellant.	Firers noted excessive noise.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
C-SMG	Cracked or broken bolts (S/T 16).	Use harder steel.	Two bolts failed.
	Safety restrictions limit the use of the rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired before cooling.
C-AR	Lack of multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.
	Broken action spring guide assemblies. (S/T 16).	Unknown.	Seven action spring guide assemblies failed.
	Safety restrictions limit the use of the automatic rifle by the infantry. (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired in an automatic rifle before cooling.
S-AR	Lack of a multiround charging device, which was not furnished with weapon (S/T 5).	Develop multiround charging device.	Multiround charging device was not provided with magazine or ammunition.
	Weapon was unreliable in functioning after exposure to sand, mud, and water (S/T 13, S/T 16).	Unknown	Occurred during portability exercise test firing.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-AR	The reversibility of the tang on the carrier cap assembly (S/T 15).	Stamp side of bolt carrier with an R and arrow on one side and MG and arrow on other side to indicate direction of cap for each configuration.	Firers assembled rifle with the tang on the carrier cap assembly reversed.
	Separation of the bolt carrier and piston assembly (S/T 16).	Use a more reliable solder.	One piston separated from bolt carrier.
	Safety restrictions limit the use of the automatic rifle by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired in an automatic rifle before cooling.
	Weapon fires inadvertently when "hitting the ground" with the butt (S/T 18).	Redesign the safety mechanism to lock the bolt in the forward position while on safe.	Firers noted inadvertent firing when "hitting the ground" with the butt.
Code S MG	The reversibility of the tang on the carrier cap assembly (S/T 15).	Stamp side of bolt carrier with an R and arrow on one side and MG and arrow on other side to indicate direction of cap for each configuration.	Firers assembled weapon with the tang on the carrier cap assembly reversed.
	Excessive number of broken or cracked bolts. (S/T 16)	Use harder steel.	Five bolts failed.
	Separation of the bolt carrier and piston assembly. (S/T 16).	Use a more reliable solder.	Two pistons separated from carrier.
	Broken barrel bushing gas rings (S/T 16).	Unknown.	One set of barrel bushing gas rings failed.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
Code S MG	Broken carrier cap rollers (S/T 16).	Make carrier cap rollers of harder steel.	One carrier cap roller failed.
	A hole was blown in barrel forward of gas piston (S/T 16).	Increase quality control.	Hole was apparently drilled too far.
	Excessive number of failures to feed (S/T 16).	Redesign feed cover.	Average rate of 1 in 249 rounds fired.
	Excessive number of failures to fire (S/T 16).	Unknown.	Average rate of 1 in 233 rounds fired.
	Excessive number of failures to extract (S/T 16).	Unknown.	Average rate of 1 in 916 rounds fired.
	Excessive number of failures to eject (S/T 16).	Unknown.	Average rate of 1 in 726 rounds fired.
	Excessive number of bolt underrides (S/T 16)	Redesign feed cover.	Average rate of 1 in 828 rounds fired.
	Explosion occurred when bolt was not fully closed and locked in barrel extension, seriously damaging weapon (S/T 16, S/T 18).	Make more positive barrel lock pin, and increase barrel size to give fewer cook-offs.	Round apparently cooked off while bolt was not engaged in barrel extension.
	Tendency of the feed latch to fly apart and strike the firer in the face when the feed cover is opened (S/T 16, S/T 18).	Redesign feed cover latch.	Feed cover latch disassembled inadvertently when feed cover was opened.

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<u>WEAPON</u>	<u>DEFICIENCY</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
Code S MG	Safety restrictions limit the use of the machine gun by the infantry (S/T 18).	Unknown.	Safety restrictions limited the number of rounds fired in the machine gun before cooling or changing barrel.
	Emission of gases and particles from the feed port during firing (S/T 18, S/T 19).	Unknown.	Gas and particles were hazardous to the assistant gunner.

## 2. SHORTCOMINGS

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
M14	Lack of a 50-round minimum magazine capacity (S/T 5)	Increase magazine capacity.	Magazine had a capacity of 20 rounds point fire ammunition.
	The reversibility of the gas piston (S/T 15).	Stamp a U on the up end and a D on the down end.	Firer assembled rifle with gas piston reversed.
	Excessive number of cracked or broken bolt rollers (S/T 16).	Make bolt rollers of a harder steel.	Seven bolt rollers failed.
	Stripped windage knob pinion assembly (S/T 16).	Improve quality control.	Two windage knob pinion assemblies failed.
	Flash suppressor set screws became loose and were lost (S/T 16).	Replace screws with suitable drift pin.	Firers noted loose or lost set screws.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
M14	Forestock is susceptible to burning in sustained automatic fire (S/T 16, S/T 19).	Insulate bedding in stock where it contacts barrel and receiver group.	Six incidents of burned or cracked stocks during rate of fire test.
	Cracked or broken jaws on M2 bipod (S/T 16).	Redesign mechanism for attaching bipod to rifle.	Four incidents of M2 bipod failure.
	High noise level of safety (S/T 18).	Cushion the safety.	Noise noted when testing safeties.
	Rapid build-up and transfer of heat in sustained automatic fire causes difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted difficulty in handling the weapon from the rapid build-up of heat in sustained automatic fire.
	Recoil causes discomfort to the firer in sustained firing (S/T 19).	Provide recoil pad.	Firers noted discomfort in sustained firing.
S-R	Sight does not have a visual scale for determining zero (S/T 4).	Index the front sight post, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with a special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustment.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-R	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 30 rounds of point fire ammunition.
	Incomplete maintenance package (S/T 14, S/T 15).	Include equipment recommended in S/T 15.	Cleaning rods and bore cleaning brushes were not part of the maintenance package.
	Incomplete POMM (S/T 15).	Minimum requirements, as stated in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Too many brushes required for cleaning (S/T 15).	Reduce the number of brushes by design of a universal brush or consolidation of brushes.	The number of brushes presently issued is too many for the individual soldier to be expected to handle.
	Excessive number of cracked or broken bolt stops (S/T 16).	Harden the metal used in bolt stops.	Five bolt stops failed.
	Separation of take-down pin from trigger housing group (S/T 16).	Use a more reliable weld.	One take-down pin separated from trigger housing group.
	Rapid build-up and transfer of heat in sustained automatic fire causes difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted difficulty in handling weapon from the rapid build-up of heat in sustained automatic fire.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-R	Inoperative selector switch causes <del>weapon</del> to fire only semiautomatically (S/T 16).	Redesign linkage.	One selector switch became inoperable.
	Weapon fires with the safety and selector switch between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
	Weapon fires inadvertently when the selector switch is moved to the semiautomatic position after having pulled the trigger with the selector switch positioned between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
XM16E1	Sight does not have a visual scale for determining zero. (S/T 4).	Index the front sight post, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment. (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with a special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustment.
	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 20 rounds of point fire ammunition.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
XM16E1	Lack of adjustability of legs on bipod (S/T 14).	Redesign bipod to be adjustable for height.	Noted during all firing from prone position.
	Incomplete maintenance package (S/T 15).	Include equipment recommended in S/T 15.	Bore cleaning brush and chamber cleaning brush were not part of the maintenance package.
	Lack of a chamber cleaning brush (S/T 15).	Provide chamber cleaning brush.	Firers noted a chamber cleaning brush was needed for maintenance of the weapon.
	Separation and deformation of buffer assembly roll pins (S/T 16).	Make a more durable connection of the roll pins to the buffer assembly.	Five action spring guide assemblies failed.
	Excessive number of failures of bolt overriding the base of round while in magazine (S/T 16).	Provide more reliable magazine spring.	Average rate of 1 in 509 rounds fired.
	Excessive number of failures of bolt not remaining to rear after last round of magazine was fired (S/T 16).	Unknown.	Average rate of 1 in 180 rounds fired.
	Excessive number of failures to eject (S/T 16).	Unknown.	Average rate of 1 in 381 rounds fired.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
XM16E1	Inoperative selector switch causes rifle to fire only semiautomatically (S/T 16).	Redesign linkage.	One selector switch became inoperative.
	Frozen front sight post prevents sight adjustments (S/T 16).	Use better quality threading with closer tolerance, or redesign sight system.	Front sight post was noted frozen on preoperational inspection.
	Weapon fires with the safety and selector switch between the safe and semiautomatic position (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
	Rapid build-up and transfer of heat in sustained automatic fire causes difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted difficulty in handling the weapon from rapid build-up and transfer of heat in sustained automatic fire.
	Poor pointing characteristics (S/T 19).	Unknown.	Firers noted irregular top line and poor effectiveness in the pointed fire role.
H-R	Sight does not have a visual scale for determining zero (S/T 4).	Index and graduate rear sight.	Firers could not record zero on rifle from a visual scale.
	Rear sight requires special tools for adjustment (S/T 4, S/T 14).	Redesign rear sight to be adjustable without special tools.	Firers had to adjust rear sight with a special tool.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
H-R	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 20 rounds of point fire ammunition.
	Incomplete maintenance package (S/T 14, S/T 15).	Include equipment recommended in S/T 15.	Bore cleaning brush and cleaning rod were not part of the maintenance package.
	Lack of adjustability of legs on bipod (S/T 14).	Redesign bipod to be adjustable for height.	Noted during all firing from the prone position.
	Incomplete POMM (S/T 15).	Minimum requirements, as stated in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Bayonet adapter set screws became loose and were lost (S/T 16).	Use Lock Tight.	Set screws vibrated and fell out.
	Broken bolt stop spring (S/T 16).	Use a less brittle spring.	Five bolt stop springs failed.
	Excessive number of blown primers (S/T 16).	Unknown.	Fires observed with cartridge cases with blown primers.
	Excessive number of double feeds (S/T 16).	Unknown.	Average rate of 1 in 447 rounds fired.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
H-R	Rapid build-up and transfer of heat in sustained semiautomatic fire causes difficulty in handling the weapon. (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from rapid build-up and transfer of heat in sustained semi-automatic fire.
	Inability to use trigger when the soldier wears arctic mitten (S/T 19).	Develop winter trigger kit.	Firers noted that trigger could not be used while wearing arctic mittens.
	Sights not operable with minimum motion (S/T 4, S/T 19).	Redesign rear sight.	Firers took too much time for elevation and windage adjustment.
A-R	Sights do not have a visual scale for determining zero (S/T 4).	Index the front sight post and graduate the rear sight, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with a special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustment.
	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 20 rounds of point fire ammunition.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
A-R	Incomplete maintenance package (S/T 15).	Include equipment recommended in S/T 15.	Bore cleaning brush and chamber cleaning brush not part of the maintenance package.
	Lack of adjustability of legs on bipod (S/T 14).	Redesign bipod to be adjustable for height.	Noted during all firing from the prone position.
	Incomplete POMM (S/T 15).	Minimum requirements as stated in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Lack of a chamber cleaning brush (S/T 15).	Provide chamber cleaning brush.	Firers noted a chamber cleaning brush was needed for maintenance of the weapon.
	Separation of the upper handguard liner from the upper handguard (S/T 16).	Unknown.	The liner separated from the handguard section during normal use of the rifle.
	Excessive number of double feeds (S/T 16).	Unknown.	Average rate of 1 in 995 rounds fired.
	Excessive number of failures of the bolt overriding the base of round while in magazine (S/T 16).	Unknown.	Average rate of 1 in 1,072 rounds fired.
	Weapon fires with the safety and selector switch between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.

IV-16

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
A-R	Alternate safety and selector switch has no indicator (S/T 18)	Redesign switch to have a positive indicator.	Firers noted the lack of a positive indicator on the alternate safety and selector switch.
	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from rapid build-up and transfer of heat in sustained automatic fire.
	Inability to use trigger when the soldier wears arctic mittens (S/T 19).	Develop winter trigger kit.	Firers noted that the trigger could not be used while wearing arctic mittens.
S-C	Sight does not have a visual scale for determining zero (S/T 4).	Index front sight post, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with a special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustments.
	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 30 rounds of point fire ammunition.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-C	Lack of a means of carrying cleaning equipment. (S/T 15).	Provide for storage of the cleaning equipment in the stock.	No means of carrying the cleaning equipment was provided.
	Incomplete maintenance package (S/T 14, S/T 15).	Include recommended equipment in S/T 15.	Cleaning rods and bore cleaning brushes were not part of the maintenance package.
	No carrying sling provided with weapon (S/T 14).	Provide sling.	Sling was not provided with weapon.
	Incomplete POMM (S/T 15).	Minimum requirements as stated in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Too many brushes required for cleaning (S/T 15).	Reduce the number of brushes by design of a universal brush or consolidation of brushes.	The number of brushes presently issued is too many for the individual soldier to be expected to handle.
	Frozen front sight post prevented sight adjustments (S/T 16).	Use better quality threading with closer tolerance, or redesign sight system.	Front sight post became frozen and could not be adjusted.
	Excessive number of cracked or broken bolt stops (S/T 16).	Harden metal of bolt stops.	Three bolt stops failed.
	Frozen gas port rings (S/T 16).	Unknown.	Gas port rings became frozen during firing.

IV-18

# CONFIDENTIAL

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-C	Weapon fires with safety selector switch between the safe and semiauto-matic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
	Weapon fires inadvertent-ly when the selector switch is moved to the semiauto-matic position after having pulled the trigger with the selector switch positioned between the safe and semi-automatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon. (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from rapid build-up and transfer of heat in sustained automatic fire.
C-SMG	Inability of the weapon to accept a bayonet (S/T 1).	Unknown.	Weapon would not accept a bayonet.
	Sight does not have a visual scale for determining zero (S/T 4).	Index the front sight, or redesign sight system.	Firer could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with a special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustments.

IV-19

# CONFIDENTIAL

# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
C-SMG	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 10 rounds of point fire ammunition.
	Lack of a means of carrying cleaning equipment. (S/T 15).	Provide for storage of cleaning equipment in the stock.	No means of carrying the cleaning equipment was provided.
	Incomplete maintenance package (S/T 14, S/T 15).	Include equipment recommended in S/T 15.	Bore cleaning brush, chamber brush, and cleaning rods were not part of the maintenance package.
	No carrying sling provided with weapon (S/T 14).	Provide sling.	Sling was not provided with weapon.
	Incomplete POMM (S/T 15).	Minimum requirements as stated in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Lack of a chamber cleaning brush (S/T 15).	Provide chamber cleaning brush.	Firers noted a chamber cleaning brush was needed for maintenance on the weapon.
	Excessive number of failures of bolt to remain to the rear after last round of magazine was fired (S/T 16).	Unknown.	Average rate of 1 in 612 rounds fired.
	Weapon fired with the safety and selector switch between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.

17-20

# CONFIDENTIAL

# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
C-SMG	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from the rapid build-up and transfer of heat in sustained automatic fire.
M14E2	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 20 rounds of point fire ammunition.
	Excessive muzzle flash with tracer ammunition (S/T 6, S/T 11).	Use different propellant in cartridge or redesign muzzle brake compensator.	Occurred during both semiautomatic and automatic firing.
	The reversibility of the gas piston (S/T 15).	Stamp a U on the up end and a D on the down end.	Firers could assemble rifle with gas piston reversed.
	Difficulty in removing the muzzle brake compensator (S/T 15).	Unknown.	Carbon deposit prevented removal of muzzle brake compensator during normal cleaning.
	Forestock is susceptible to burning in sustained automatic fire (S/T 16, S/T 19).	Insulate bedding in stock where it contacts barrel and receiver group.	Occurred during rate of fire and assault exercises.
	Cracked or broken jaws on M2 bipod (modified) (S/T 16).	Redesign mechanism for attaching bipod to rifle.	Resulted from excessive torqueing of bipod bolt.

IV-21

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
M14E2	High noise level of the safety (S/T 18).	Cushion the safety.	Noise noted when testing safeties.
	Recoil causes discomfort to the firer in sustained firing (S/T 19).	Unknown.	Firers noted discomfort in sustained firing.
	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted difficulty in handling the weapon from build-up and transfer of heat in sustained automatic fire.
C-AR	Sight does not have a visual scale for determining zero (S/T 4).	Index the front sight or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustments.
	Rear sight lacks adjustability for elevation (S/T 4).	Redesign rear sight or redesign sight system.	Firers noted there was no adjustment of rear sight for elevation.
	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 30 rounds of point fire ammunition.
	Bipod becomes detached too easily when inadvertently struck (S/T 13, S/T 14).	Redesign bipod with a positive type of fastener for securing to barrel.	Noted during portability exercise.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight or redesign sight system.	Firers had to adjust front sight with special tool or cartridge.

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# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
C-AR	Incomplete maintenance package (S/T 14, S/T 15).	Include equipment recommended in S/T 15.	Cleaning rods, bore cleaning brush, and chamber cleaning brush were not part of the maintenance package.
	No carrying slings provided with weapon (S/T 14).	Provide sling.	Sling was not provided with weapon.
	Lack of adjustability of legs on bipod (S/T 14).	Redesign bipod to be adjustable for height.	Noted during all firing from the prone position.
	Incomplete POMM (S/T 15).	Minimum requirements as stated in Army Regulations should be followed.	POMM did not contain minimum requirements.
	Lack of a chamber cleaning brush (S/T 15).	Provide chamber cleaning brush.	Firers noted a chamber cleaning brush was needed for maintenance of the weapon.
	Excessive number of broken extractor springs (S/T 16).	Unknown.	Five extractor springs failed.
	Cracked or broken bolt (S/T 16).	Redesign bolt.	One bolt failed.
	Excessive number of failures to extract (S/T 16).	Unknown.	Average rate of 1 in 666 rounds fired.
	Weapon fired with the safety and selector switch between the safe and semi-automatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.

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# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
C-AR	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon. (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from rapid build-up and transfer of heat in sustained automatic fire.
S-AR	Weapon lacks a semi-automatic capability (S/T 1).	Provide semiautomatic capability.	Automatic rifle often employed in semiautomatic mode of fire. (Ref para 21, FM 23-12.)
	Sight does not have a visual scale for determining zero (S/T 4).	Index the front sight, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firer had to adjust front sight with special tool or cartridge.
	Difficulty in making rapid large range adjustments on the rear sight (S/T 4).	Redesign rear sight with a quick release range scale slide or an elevation knob as in the M14E2.	Firer took too much time making range changes.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustment.
	Impossibility of matching the index line with the range scale of the rear sight (S/T 4).	Rear sight should be designed so that detents correspond to indexed ranges.	Noted during testing of sights.

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IV-24

# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-AR	Lack of a 50-round minimum magazine capacity (S/T 5).	Increase magazine capacity.	Magazine had a capacity of 30 rounds of point fire ammunition.
	Bipod becomes detached too easily when inadvertently struck. (S/T 13, S/T 14).	Redesign bipod with a positive type of fastener for securing to barrel.	Noted during portability exercise.
	Incomplete maintenance package (S/T 14, S/T 15).	Include equipment recommended in S/T 15.	Bore cleaning brush and cleaning rods not provided.
	No carrying sling provided with weapon (S/T 14).	Provide sling.	Sling was not provided with weapon.
	Incomplete POMM (S/T 15).	Minimum requirements as stated in Army Regulations should be followed.	POMM did not contain minimum requirements.
	Too many brushes required for cleaning (S/T 15).	Reduce the number of brushes by design of a universal brush or consolidation of brushes.	The number of brushes presently issued is too many for the individual soldier to be expected to handle.
	Sight housing assembly pin was easily damaged or lost (S/T 16).	Unknown.	Occurred throughout testing.
	Excessive number of run-away guns (S/T 16, S/T 18).	Redesign bolt carrier or sear to engage prior to passing cartridges in magazine while traveling rearward.	Sixty-five incidents occurred.

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# CONFIDENTIAL

<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
S-AR	Weapon fires with the safety and selector switch between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.
	Rapid build-up and transfer of heat in sustained automatic fire cause difficulty in handling the weapon (S/T 19).	Unknown.	Firers noted the difficulty in handling the weapon from rapid build-up and transfer of heat in sustained automatic fire.
	Some left-handed firers could not use the offset (to the left) sights (S/T 4, S/T 19).	Redesign sight.	Some left-handed firers noted that they could not achieve proper sight picture and sight alignment with the offset sights.
M60 MG	Ejection pattern interfered with left hand on forestock (S/T 19).	Redesign receiver group to eject cartridge cases to the right.	Causes some firers to use alternate positions.
	Excessive number of bent rear sight adjustable range scale. (S/T 4, S/T 16).	Make range scale of steel.	21 of 25 rear sight adjustable range scales bent.
	Reversibility of the gas piston (S/T 15).	Stamp a U on the up end and a D on the down end.	Firers assembled M60 with gas piston reversed.
	M122 tripod legs easily bent (S/T 16).	Make legs of a harder steel.	Two M122 tripod legs bent.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
M60 MG	Gas cylinder plug easily lost (S/T 16).	Use lacing on gas cylinder.	Gas cylinder easily became loose and then lost.
Code S MG	Sight does not have a visual scale for determining zero (S/T 4).	Index the front sight, or redesign sight system.	Firers could not record zero on rifle from a visual scale.
	Front sight requires a tool or cartridge for adjustment (S/T 4).	Redesign front sight, or redesign sight system.	Firers had to adjust front sight with special tool or cartridge.
	Sight is not operable with minimum motion (S/T 4, S/T 19).	Redesign sight system.	Firers used too much motion and took too much time for elevation adjustments.
	Difficulty in making rapid large range adjustments on rear sight (S/T 4, S/T 19).	Redesign rear sight with a quick release range scale slide.	Firer took too much time in making range changes.
	The small aperture rear sight makes use of the sight difficult under low illumination conditions and restricts the gunner's field of view while engaging wide area targets (S/T 4, S/T 19).	Redesign rear sight.	Firers noted small size of peep aperture.
	One M2 tripod had no graduations on traversing bar (S/T 9).	Improve quality control.	One traversing bar of the M2 tripod did not have any graduations.
	The reversibility of the trigger housing cover (S/T 15).	Redesign trigger housing cover.	Firers assembled the weapon with the trigger housing cover reversed.

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
Code S MG	The reversibility of the feed cover latch (S/T 15).	Redesign feed cover latch.	Firers assembled the weapon with the feed cover latch reversed.
	Incomplete maintenance package (S/T 15).	Include recommended equipment in S/T 15.	Cleaning rod and bore cleaning brush were not part of the maintenance package.
	Incomplete POMM (S/T 15).	Minimum requirements as noted in Army Regulations should be followed.	POMM did not contain minimum requirements for training test soldiers.
	Too many brushes required for cleaning (S/T 15).	Reduce the number of brushes by design of a universal brush or consolidation of brushes.	The number of brushes presently issued is too many for the individual soldier to handle.
	Trigger pin easily lost (S/T 16).	Redesign trigger pin with large detent.	Two trigger pins lost.
	Feed cover assembly pin easily loosened (S/T 16).	Redesign feed cover assembly with large detent.	Feed cover became loose.
	Windage knob easily bent (S/T 16).	Decrease length and increase diameter of windage knob.	Two windage knobs bent.
	Excessive number of ruptured cartridges (S/T 16).	Unknown.	There was a total of nine ruptured cartridges.
	Weapon fires when the safety and selector switch is between the safe and semiautomatic positions (S/T 18).	Redesign safety and selector switch.	Firers noted weapon fired as described.

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# CONFIDENTIAL

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<u>WEAPON</u>	<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
Code S MG	Ejection pattern interfered with operation of the elevating handwheel when the gun was mounted on the tripod (S/T 19).	Unknown.	Cartridges were ejected onto the elevating handwheel.
	Adjustment of the S-LMG bipod legs is difficult for soldiers wearing arctic mittens (S/T 19).	Redesign bipod adjustable leg latch to be operated while wearing arctic clothing.	Noted during firing with arctic mittens.
Cleaning Rod (M11)	Lack of durability (S/T 14, S/T 15).	Reinforce the cleaning rod joints and connections.	Firers noted breaking and cracking of cleaning rods throughout the testing.

## 3. CORRECTED DEFICIENCIES/SHORTCOMINGS

<u>WEAPON</u>	<u>DEFICIENCY/SHORTCOMING</u>	<u>CORRECTIVE ACTION</u>	<u>REMARKS</u>
M60-MG	Bolt plug lock pin easily lost (S/T 16).	The bolt plug was redesigned and no further incidents occurred.	In disassembly, the bolt plug lock was noted falling out of bolt.

## 4. PREVIOUS DEFICIENCIES

<u>WEAPON</u>	<u>DEFICIENCY PREVIOUS TEST</u>	<u>FINDINGS THIS TEST</u>
A-R	The last-round bolt stop holds the bolt to the rear while rounds remain in the magazine. (USATECOM Project No 8-4-0110-02 A)	Corrected.
	The lack of durability of the curved extension of the buffer assembly (take-down plunger housing of the guide rod weld assembly) which is used to disassemble the weapon. (USATECOM Project No 8-4-0110-02 A)	Not corrected. One take-down plunger housing broke off. The guide rod weld assembly was modified to strengthen the housing during the test.

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<u>WEAPON</u>	<u>DEFICIENCY PREVIOUS TEST</u>	<u>FINDINGS THIS TEST</u>
A-R	Failure of the extractor to remove empty cartridge cases from the chamber. (USATECOM Project No 8-4-0110-02 A)	Corrected. Nine failures to extract (FX) were noted in 68,622 rounds fired.
	Lack of durability of the nylon cap which holds the spring in the last-round bolt stop. (USATECOM Project No 8-4-0110-02 A)	Corrected.
	Lack of durability of the stock and pistol grip causes them to crack and separate from the weapon. (USATECOM Project No 8-4-0110-02 A)	Corrected.
	Sights could not be zeroed at 500 meters range. (USATECOM Project No 8-4-0110-02 A)	Corrected.

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APPENDIX V - PHOTOGRAPHS

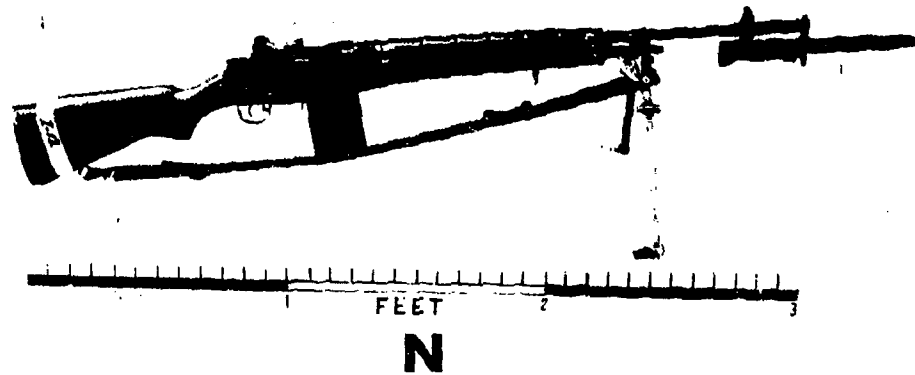
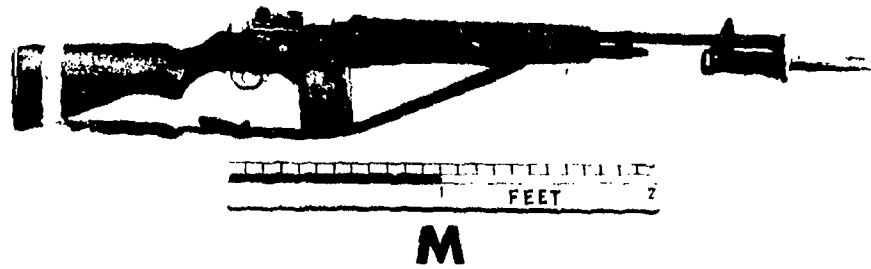
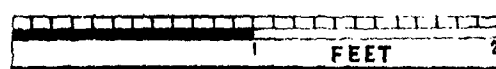
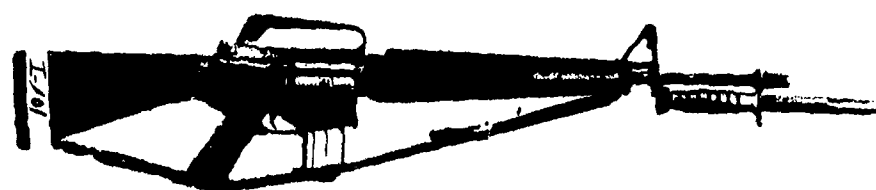


Figure 1

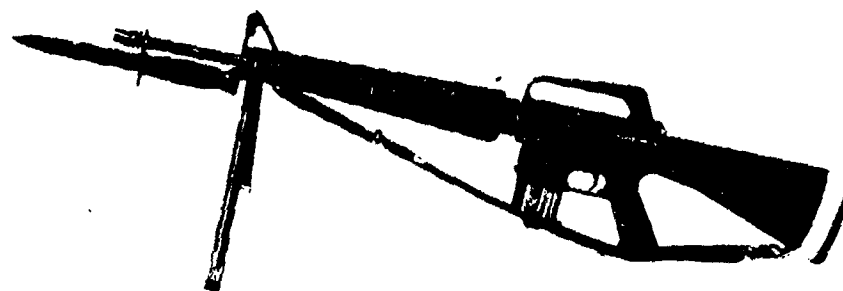
Rifle, 7.62-mm, M14

M. Without Bipod, M2

N. With Bipod, M2



**M**



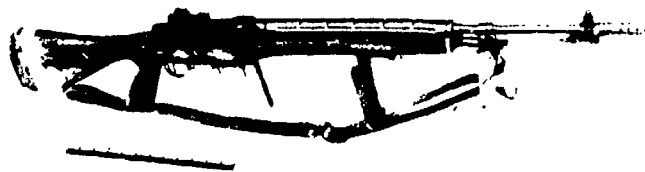
**N**

Figure 2

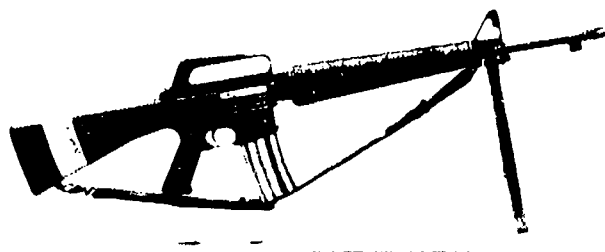
Rifle, 5.56-mm, XM16E1

M. Without Bipod, M3.

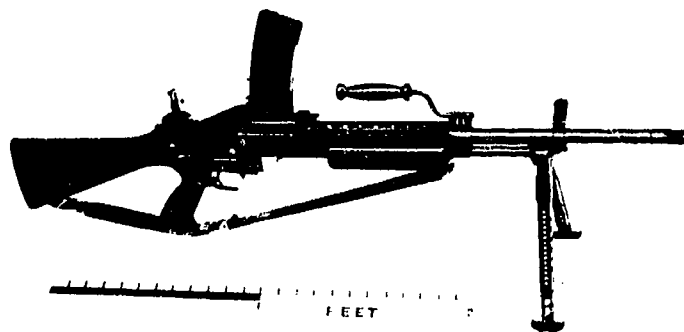
N. With Bipod, M3.



M



N



O

Figure 3

Automatic Rifles

M. Rifle, 7.62-mm, M14E2

N. Rifle, 5.56-mm, C-AR

O. Rifle, 5.56-mm, S-AR

V-3



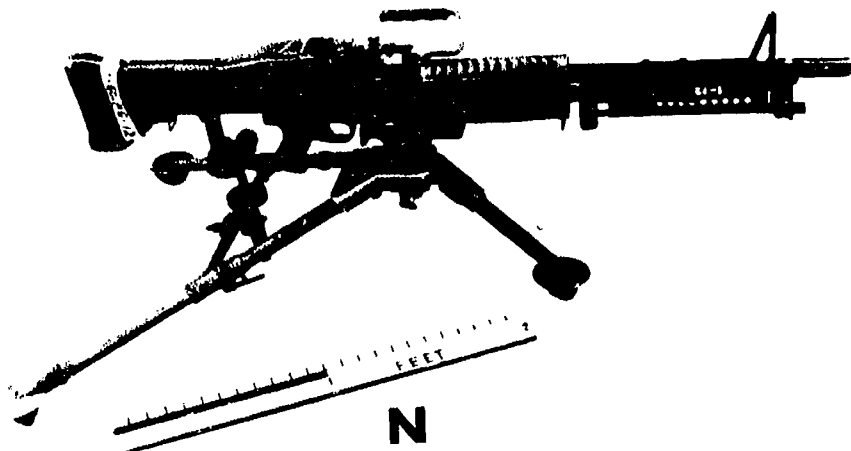
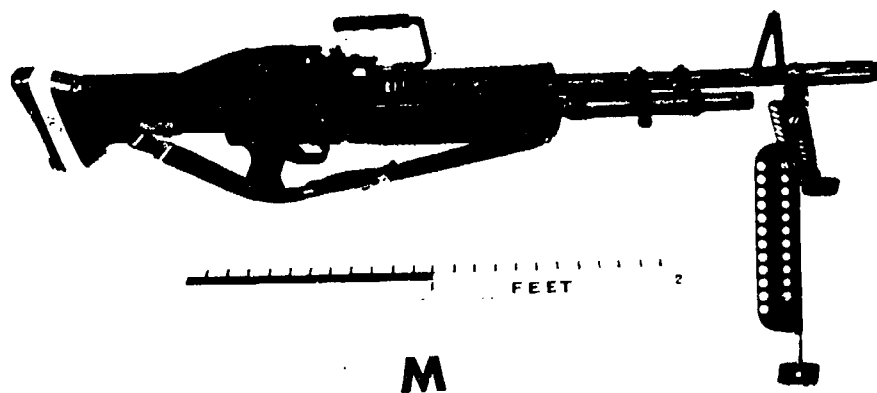
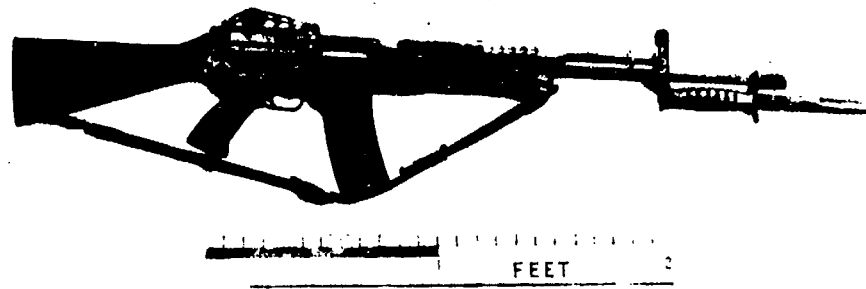


Figure 4

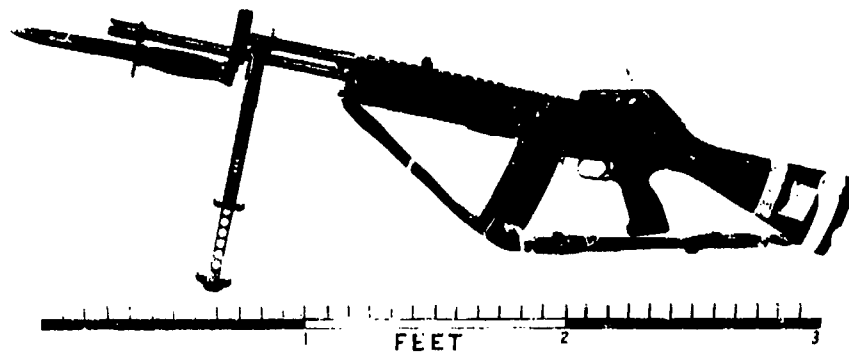
Machine Guns

M. Machine Gun, 7.62-mm, M60, on bipod

N. Machine Gun, 7.62-mm, M60, on tripod

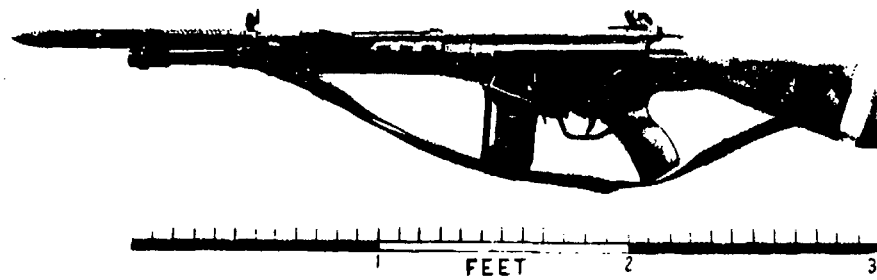


**M**



**N**

Figure 5  
Rifle, 5.56-mm, S-R  
M. Without bipod  
N. With bipod



**M**



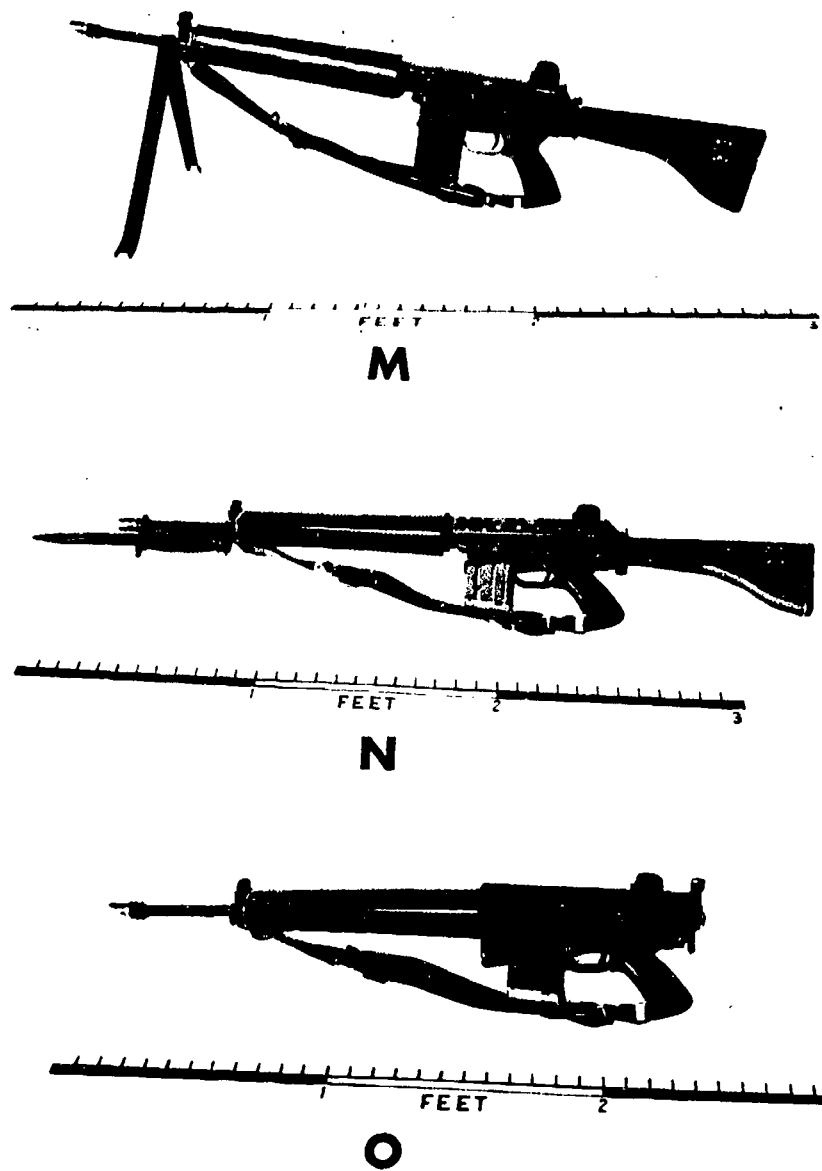
**N**

**Figure 6**

**Rifle, 5.56-mm, H-R**

**M. Without bipod**

**N. With bipod**



**Figure 7**

Rifle, 5.56-mm, A-R

M. With Bipod, M3.

N. Without Bipod, M3.

O. With Butt Stock folded.

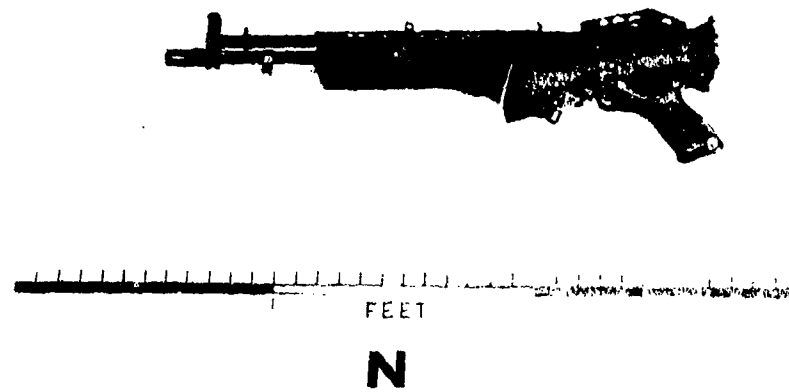
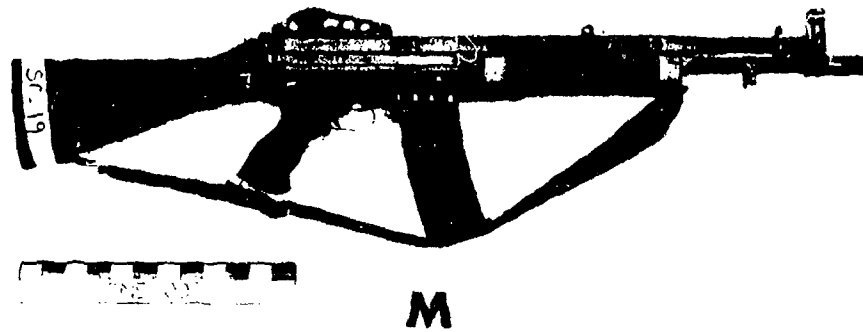


Figure 8  
Carbine, 5.56-mm, S-C  
M. With butt stock extended  
N. With butt stock folded

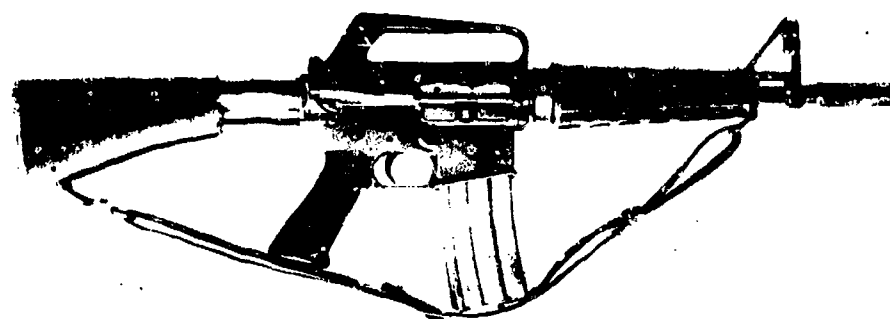
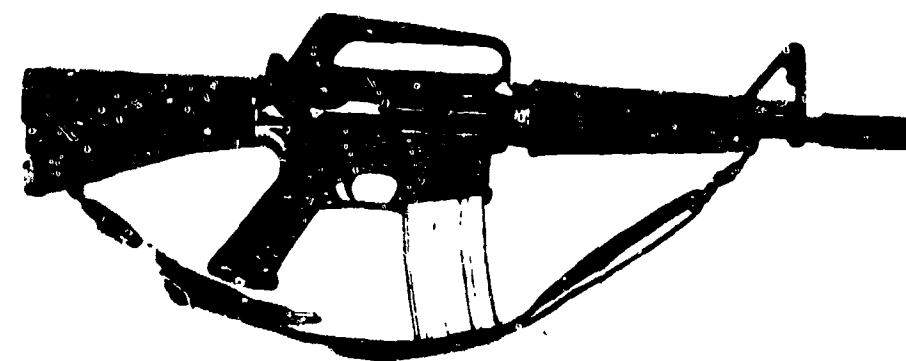
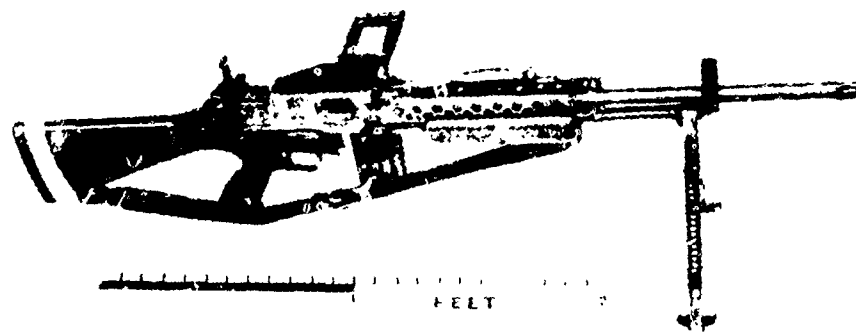


Figure 9

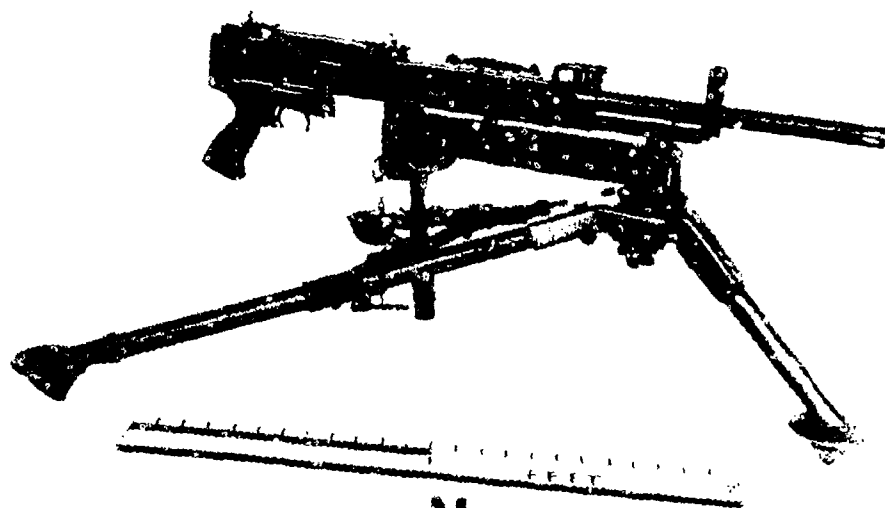
Carbine, 5.56-mm, C-SMG

M. With telescoping butt stock closed

N. With telescoping butt stock extended



M



N

Figure 10

Machine Gun

M. Machine Gun, 5.56-mm, S-LMG

N. Machine Gun, 5.56-mm, S-MMG



M



N

Figure 11

Prone Firing Position

M. Machine Gun, 5.56-mm, S-LMG.

N. Machine Gun, 5.56-mm, S-MMG



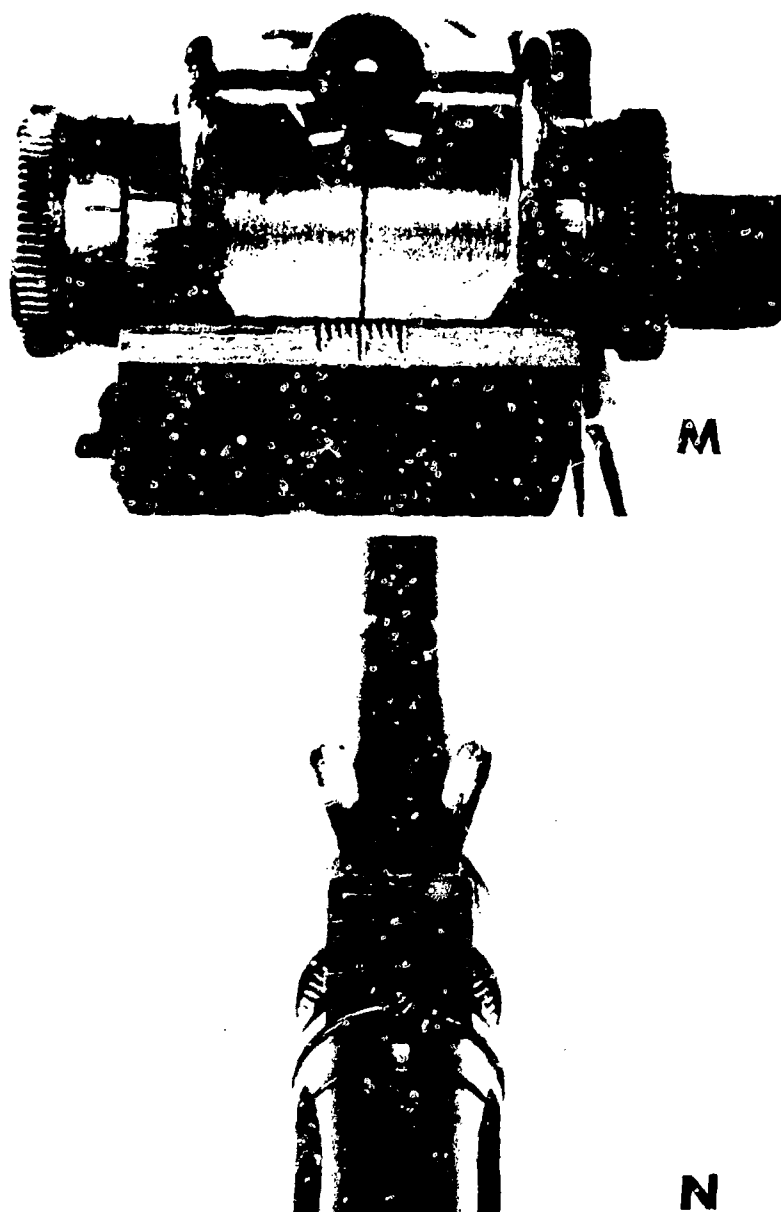


Figure 12

Sights - Rifle, 7.62-mm, M14

M. Rear view of rear sight.

N. Top rear view of front sight

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STEBE-SA (P-3110)

**11 APR 1966**

SUBJECT: Change 3 to Service Test Report for Small Arms Weapons System  
(SAWS). USATECOM Project No 8-5-0400-04 (U)

<u>Weapon</u>	<u>Ammo</u>	<u>Tgts Hit</u>	<u>HP</u>
XM16E1	M193	85	
	M196	91	
H-R	M193	61	
	M196	82	
A-R	M193	77	
	M196	68	

c. Chart 7-5, Page II-11:

<u>Weapon</u>	<u>Ammo</u>	<u>Tgts Hit</u>
M14	M198	38

d. Chart 7-14, Page II-20:

<u>Weapon</u>	<u>Ammo</u>	<u>Tgts Hit</u>
M14	M80	21

e. Add the following to the bottom of Chart 7-4, Page II-10:

<u>Weapon</u>	<u>Ammo</u>	<u>Rds Fired</u>	<u>Tgt Hits</u>	<u>HC</u>	<u>Tgts Hit</u>	<u>HP</u>	<u>PTH</u>	<u>H/PD</u>	<u>H/S</u>
A-R	M196	512	20	3.9	10	2.0	33.3	1.6	1.1

f. Add the words, Semiautomatic Fire, to the titles of Table 8-1, page 125; Table 8-2, page 126; Table 8-3 and Table 8-4, page 127.

g. Add the words, Automatic Fire, to the titles of Table 8-5, page 129; Table 8-6, page 130; and Table 8-7, page 131.

FOR THE PRESIDENT:

CHANGE NOTICE NO 3

*Ruth M. Haerr*  
RUTH M. HAERR  
Major WAC  
Adjutant

2

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DEPARTMENT OF THE ARMY  
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STEBC-SA (P-3110)

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(SAWS), USATECOM Project No 8-5-0400-04 (U)

TO: See Distribution

(C) Request that addressees make the following pen and ink changes  
in the subject document:

a. Table 7-1, Page 108:

<u>Weapon</u>	<u>Ammo</u>	<u>Tgts Hit</u>	<u>HP</u>	<u>PTH</u>
M14	M80	293		
	M62	333		
	M198	344		49.4
S-R	M193		2.5	
	M196	65		
XM16E1	M193		2.8	
	M196	78		
H-R	M193			
	M196	78		
A-R	M193	78		
	M196	79		

b. Table 7-2, Page 109:

<u>Weapon</u>	<u>Ammo</u>	<u>Tgts Hit</u>	<u>HP</u>
M14	M80	322	
	M62	311	2.3
	M198	322	
S-R	M193	92	2.2
	M196	90	

Group 4 (downgraded at 3 year intervals)  
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STEBG-SA (P-3110)

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TO: See Distribution

(C) Request that addressees make the following pen and ink changes  
in the subject document:

<u>PAGE</u>	<u>TABLE/CHART</u>	<u>WEAPON</u>	<u>AMMUNITION</u>	<u>H/PD</u>	<u>H/S</u>
108	7-1	M14	M198	1.5	1.6
109	7-2	M14	M198	1.1	1.5
II-7	7-1	M14	M198	4.4	5.6
II-8	7-2	M14	M198	2.9	3.2
II-9	7-3	M14	M198	1.7	1.8
II-10	7-4	M14	M198	1.2	1.7
II-11	7-5	M14	M198	0.7	0.8
II-12	7-6	M14	M198	0.6	0.5
II-13	7-7	M14	M198	0.2	0.2
II-14	7-8	M14	M198	3.3	6.8
II-15	7-9	M14	M198	2.2	3.3
II-16	7-10	M14	M198	0.9	1.3
II-17	7-11	M14	M198	0.7	1.1
II-18	7-12	M14	M198	0.4	0.5
II-19	7-13	M14	M198	0.5	0.4
II-20	7-14	M14	M198	0.2	0.2

FOR THE PRESIDENT:

*Ruth M. Haerr*  
RUTH M. HAERR  
Major WAC  
Adjutant

CHANGE NOTICE NO 2

Group 4 (downgraded at 3 year intervals)  
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TO: See Distribution

1. (U) Request that addressees withdraw the following pages from the subject document and substitute the inclosed corresponding pages:

- a. Page 192.
- b. Page 197.
- c. Appendix II, Page 106.
- d. Appendix II, Page 108.
- e. Appendix II, Page 114.
- f. Appendix II, Page 115.
- g. Appendix II, Page 117.

2. (U) Disposition of withdrawn pages shall be in accordance with the provision of AR 380-5.

FOR THE PRESIDENT:

7 Incl  
as

RUTH M. HAERR  
Major WAC  
Adjutant

CHANGE NOTICE NO 1

REGRADED  
WHEN SEPARATED FROM  
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TABLE 16-1

TOTAL AND RATE OF MALFUNCTIONS---RIFLES AND CARBINES

WPN	TOTAL RDS FIRED		(1) FF	FFR	FX	FJ	FBC	FMR	BUB	DF
		(2) TOTAL	200	16	18	19	29	4		4
M14	445,268	(3) RATE	2221	27829	24737	23435	15354	111317		111317
		TOTAL	17	39	20	17	3	4		42
S-R	110,371	RATE	6492	2830	5519	6492	36790	27593		2628
		TOTAL	75	39	86	251	3	33		33
XM16E1	95,720	RATE	1276	2454	1113	381	31907	2900		2900
		TOTAL	45	2	18					170
H-R	76,026	RATE	1689	38013	4224					447
		TOTAL	46	6	9	39	4			69
A-R	68,622	RATE	1492	11370	7625	1760	17155			995
		TOTAL	60	14	65	1			3	42
S-C	83,107	RATE	1385	5636	1278	83107			27702	1978
		TOTAL	29	4	43	2				11
C-SMG	81,871	RATE	3823	20467	1904	40935				7443

(Continued)

WPN		BOB	FBF	FBR	FTR	BCS	(4) TOTAL	(5) TOTAL MINUS (FBR)
	TOTAL	11	5	6		1	313	307
M14	RATE	40479	89054	74211		445268	1423	1450
	TOTAL	1		10		2	155	145
S-R	RATE	110371		11037		55186	712	761
	TOTAL	188		532		2	1242	710
XM16E1	RATE	509		180		47860	77	135
	TOTAL	1		7			243	236
H-R	RATE	76026		10861			313	322
	TOTAL	64		3			240	237
A-R	RATE	1072		22873			286	290
	TOTAL	42	2	5	1		231	226
S-C	RATE	1978	41553	16621	83107		354	368
	TOTAL	11	1	122			222	100
C-SMG	RATE	7443	81871	671			369	818

- LEGEND: (1) Abbreviations (ref para 2.16.2.1.4).  
 (2) Total of each type of malfunction for each type candidate weapon.  
 (3) Rate--Malfunction occurred: 1:rounds fired. (Example: M14, 200 Failures to Feed (FF), 1 FF occurred every 2,221 rounds fired.)  
 (4) Total malfunctions for each type candidate weapon.  
 (5) Total malfunctions minus the total FBR for each type candidate weapon (computed because of excessive XM16E1 and C-SMG FBR's).

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2.16.3.2.6 (C) The following were significant with respect to the durability of the S-C:

- a. Two incidents of bolts being cracked or broken.
- b. Three incidents of bolt stops being broken.
- c. One incident of the carrier and piston assembly being separated.

2.16.3.2.7 (C) The following were significant with respect to the reliability of the S-C:

- a. One incident of the front sight post being frozen.
- b. Seven incidents of the gas port rings being frozen.
- c. Two hundred thirty-two (232) incidents of malfunctions.  
(Rate, 1:358 rounds fired.)

2.16.3.2.8 (C) The following were significant with respect to the durability of the C-SMG: Two incidents of bolts being cracked or broken.

2.16.3.2.9 (C) The following were significant with respect to the reliability of the C-SMG:

- a. One hundred twenty-two (122) incidents of the bolt failing to remain to the rear after the last round in the magazine had been fired. (Rate, 1:671 rounds fired.)
- b. Two hundred twenty-two (222) incidents of malfunctions.  
(Rate, 1:369 rounds fired.)

2.16.3.3 (C) Automatic Rifles (U)

2.16.3.3.1 (C) The total and rate of malfunctions by type for each candidate automatic rifle are listed in Table 16-3. The total and rate of malfunctions by type for each candidate automatic rifle are listed in Charts 16-15 through 16-17, Appendix II.

2.16.3.3.2 (C) The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each type candidate automatic rifle are listed in Table 16-4. The total and rate of malfunctions, including broken, damaged, and lost parts, by category for each candidate automatic rifle are listed in Charts 16-18 through 16-20, Appendix II.

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TABLE 16-2  
TOTAL AND RATE OF MALFUNCTIONS, AND BROKEN, DAMAGED, AND LOST PARTS,  
BY CATEGORY -- RIFLES AND CARBINES

WEAPON	TOTAL ROUNDS FIRED	(1) CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL (4)
	(2) TOTAL	261	23	46	1	331
M14	445,268	1706	19359	9680	445268	1345
	(3) RATE	122	15	19	2	158
S-R	110,371	905	7358	5809	55186	699
	TOTAL	1140	74	55	5	1274
XM16E1	95,720	84	1294	1740	19144	75
	RATE	151	79	23	2	255
H-R	76,026	503	962	3305	38013	298
	TOTAL	208	18	24	14	264
A-R	68,622	330	3812	2859	4902	260
	RATE	167	39	22	3	231
S-C	83,107	498	2130	3778	27702	354
	TOTAL	202	14	4	2	222
C-SMG	81,871	405	5448	20468	40936	369
	RATE					

- LEGEND:
- (1) Category defined (ref para 2.16.2.1.2).
  - (2) Total of each type of malfunction by category for each weapon candidate.
  - (3) Rate--Malfunction by category occurred 1: rounds fired. (Example: M14, 261 Category I malfunctions, 1 Category I malfunction occurred every 1706 rounds fired.)
  - (4) Total malfunctions for each type candidate weapon.

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CHART 16-1 (Continued)

M14--TYPES OF MALFUNCTIONS AND RATES

SLOT NO	SERIAL NUMBER	RDS FIRED	FE RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
81	1323461	3111	1 3111	1 3111										2	1556
82	1324207	4766													
83	1277629	4016													
84	340418	4341													
85	337948	3945	2 1973											2	1973
86	338411	3932	4 983											4	983
87	340709	4649		1 4649										1	4649
88	339441	4835	2 2418											2	2418
89	341931	5224	15 327											16	327
90	340463	4678	2 2339											2	2339

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CHART 16-1 (Continued)

M14--TYPES OF MALFUNCTIONS AND RATE

II-106

SLOT NO	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
91	340255	3173		2											
92	335590	3655		1828										2	1828
93	334570	5710	10 571	1 5710						1 5710				12	476
94	342221	5144	4 1286											4	1286
95	339693	4618													
96	338976	6329													
97	338202	3800							1 3800			1 3800		2	1900
98	338700	4752									1 4752			1	4752
99	331046	4187													
100	339621	4483												1	4483
*TOTALS:		445,268	200/2,221	16/27,829	18/24,737	19/23,435	29/15,354	4/111,317	4/111,317	11/40,479	5/89,054	6/74,211	1/445,268	313	1,423

LEGEND: \* Total of each type of malfunction/rate of malfunction for the M14's

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CHART 16-2

S-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO	SERIAL NUMBER	RDS FIRED	(1)FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	(4) TOTAL	RATE
121	000467	6,732	(2) 2 (3) 3366	9 748	2 3366	1 6732		1 6732				2 3366		17	396
122	000475	5,717				3 1906								3	1906
123	000463	5,848		2 2929				1 5848	3 1949					6	975
124	000430	5,651	4 1413	3 1884	2 2826				2 2826					11	514
125	000468	6,765	2 3383					1 6765	5 1353					8	846
126	000471	7,219	1 7219	3 2406	3 2406	1 7219	3 2406		6 1203			1 7219		18	401
127	000466	6,380		1 6380		1 6380			1 6380				2 3190	5	1276
128	000469	6,518	2 3259	3 2173	2 3259	1 6518			11 593					19	343
129	000474	6,770		1 6770	3 2257	1 6770			2 3385			1 6770		8	846
130	000473	4,768		1 4768								1 4768		2	2384

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- LEGEND: (1) Abbreviations (ref para 2.16.2.1.3)  
 (2) Total of each type of malfunction for each S-R  
 (3) Rate-Malfunction occurred 1: rounds fired  
 (4) Total malfunctions for each S-R

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CHART 16-2 (Continued)

## S-R-TYPES OF MALFUNCTIONS AND RATES

SLOT NO	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
131	000459	1,564		1 1564		1 1564								2	782
132	000476	3,000	1 3000	1 3000	1 3000				1 3000					4	750
133	000432	5,836		2 2918	1 5836	1 5836			1 5836			1 5836		6	973
134	000465	4,072	2 2036	1 4072	3 1359	1 4072			2 2036	1 4072		1 4072		11	370
135	000433	5,576		2 2738				1 5576				1 5576		4	1394
136	000445	7,049													
137	000472	4,962													
138	000470	5,241	3 1747	7 749	3 1747	3 1747			3 1747			1 5241		20	262
139	000434	6,658				3 2219			4 1665			1 6658		8	832
140	000429	4,045		2 2023					1 4045					3	1682
TOTALS:		110,371	17/6,492	39/2,830	20/5,519	17/6,492	3/36,790	4/27,593	42/2,628	1/110,371		10/11,037	2/55,186	155	712

LEGEND: \* Total of each type of malfunction/rate of malfunction for the S-R's

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CHART 16-5

## A-R--TYPES OF MALFUNCTIONS AND RATES

SLOT NO	SERIAL NUMBER	RDS FIRED	(1) FE RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	(4) TOTAL	RATE
161	039	1,852	(2) 2 (3) 926			1 1852				1 1852		1 1852		5	370
162	031	3,342	10 334	2 1671			3 1114		1 3342	5 668				21	159
163	044	3,404	3 1135	1 3494	3 1135	3 1135				2 1702		1 3404		13	262
164	040	3,350	1 3350	1 3350		1 3350				5 670		1 3350		9	372
165	042	5,495	5 1099		1 5495	4 1371			1 5495	5 1099				16	343
166	043	5,126	4 1281	1 5126		1 5126	1 5126			34 151				41	125
167	041	860													
168	049	3,809	8 476			2 1404			5 762	1 3809				16	238
169	056	3,710			2 1855				2 1855	1 3710				5	742
170	054	3,582	1 3582			2 1791			5 716					8	448

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- LEGEND: (1) Abbreviations (ref para 2.16.2.1.3)  
 (2) Total of each type malfunction for each A-R  
 (3) Rate-Malfunction occurred 1: rounds fired  
 (4) Total malfunctions for each A-R



CHART 16-5 (Continued)

## A-R--TYPES OF MALFUNCTIONS AND RATES

II-114

SLOT NO	SERIAL NUMBER	RDS FIRED	FF RATE	FFR RATE	FX RATE	FJ RATE	FBC RATE	FMR RATE	DF RATE	BOB RATE	FBF RATE	FBR RATE	BCS RATE	TOTAL	RATE
171	046	2,974	1 2974			1 2974				1 3831				2	1487
172	050	3,831	2 1915			2 1915			1 3831	1 3831				6	638
173	055	3,030													
174	051	4,018	4 1004			6 669			6 669	1 4018				17	236
175	057	3,456	2 1728			3 1152			22 157	1 3456				28	123
176	052	3,286	1 3286			3 1095			1 3286					5	657
177	048	3,517	1 3517			2 1758			12 277	4 879				20	176
178	053	3,188			1 1594	3 1063			9 354	3 1063				17	188
179	045	2,972	1 2972	1 2972					2 1486					4	743
180	047	3,820				5 764			2 1910					7	546
*TOTALS:		68,622	46/1,492	6/11,370	9/7,625	39/1,760	4/17,155		69/995	64/1,072		3/22,873		240	286

LEGEND: \*Total of each type of malfunction/rate of malfunction for the A-R's

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CHART 16-6

M14--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

M14							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
1	361762	7599	8	2			10
2	362843	5786	1				1
3	362985	6110			1		1
4	348587	4544	2	1	1		4
5	362845	5298	4				4
6	360537	6519	8	2			10
7	363119	6116	2		2		4
8	517306	4723			1		1
9	355524	5563	4		1		5
10	359687	6252	16	1	1		18
11	359440	4271	2		1		3
12	361756	4695	4				4
13	363367	1440			2		2
14	361036	6752	9	2	1		12
15	357681	3553	1	1	1		3
16	362231	6578	7		1		8
17	362648	5398	4				4
18	1527075	4185			2		2
19	361252	4010	6	1	1		8
20	363020	3675	3				3
M14							
21	362741	6824	18	2	2		22
22	5126131	6174	1				1
23	1526384	3756			1		1
24	362607	5321			1		1
25	361389	5662	7	1	1		9
26	363035	6439	8				8
27	358991	6598	2				2
28	361718	7257	9	1	5		15
29	360277	4716	2				2
30	362710	5813	7		2		9
31	361284	5264	22	4	2		28
32	362010	4589	1		1		2
33	363056	4963	6	1			7
34	357377	4017	1		2		3
35	358465	4707	4		1		5
36	1521665	3666	1				1
37	1522227	5015	1				1
38	1527945	4304	3				3
39	360722	4655	6		3		9
40	1537013	4264					

LEGEND: \*Category defined (ref para 2.16.2.1.2)

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(Continued)

## M14--MALFUNCTIONS AND PROBLEMS, AND LOST PARTS BY CATEGORY

SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
41	362015	4742					
42	919297	3584			1		1
43	363267	3572					
44	905153	3863					3
45	361225	3840					1
46	362809	4100			1		1
47	1524923	4600					
48	1521267	3843			1		1
49	363024	4085					
50	360922	4885	2				2
51	1279906	3190	1				1
52	1280199	3026					
53	1273834	3755	2				2
54	1269018	4247					
55	1278193	4511			1		1
56	1277818	4881	2				2
57	1278606	3503	1				1
58	1282371	3382	2				2
59	1280297	3490					
60	1272291	4154	2				2
M14							
61	1276387	2276	1				1
62	1278943	3326					
63	1272791	3263					
64	1278693	3365					
65	1278406	2877	1				1
66	1280365	2549	1				1
67	1269929	5836					
68	1279386	4041					
69	339688	2977	4	1			5
70	341790	2377					
71	1278818	4806					
72	336015	3841	2				2
73	1282665	5068					
74	341598	3830	2				2
75	336004	2382			1		1
76	339636	3634					
77	338693	3424	6	1			7
78	313394	3950	2				4
79	339594	3385					
80	1277359	2389					

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CHART 16-6 (Continued)

M14--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

M14							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
81	1323461	3111	1			1	2
82	1324207	4766					
83	1277629	4016					
84	340418	4341					
85	337948	3945	2				2
86	338411	3932	4				4
87	340709	4649			1		1
88	339441	4835	2				2
89	341931	5224	16				16
90	340463	4678	2				2
91	340255	3173					
92	335590	3655	2				2
93	334570	5710	10	1	1		12
94	342221	5144	4				4
95	339693	4618					
96	338976	6329					
97	338202	3800	1		1		2
98	338700	4752			1		1
99	331046	4187					
100	339621	4483		1			1

TOTALS: 445,268 261 23 46 1 331

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CHART 16-7

## RIFLES--MALFUNCTIONS AND BROKEN, DAMAGED, AND LOST PARTS BY CATEGORY

S-R							
SLOT NO	SERIAL NO	ROUNDS FIRED	CATEGORY * I	CATEGORY II	CATEGORY III	CATEGORY IV	TOTAL
121	000467	6732	12	3	2		17
122	000475	5717	3				3
123	000463	5848	6				6
124	000439	5651	9	1	1		11
125	000468	6765	5	2	2		9
126	000471	7219	17	1			18
127	000466	6380	2		3		5
128	000469	6518	16	2	1		19
129	000474	6770	8				8
130	000473	4768	1		1		2
131	000459	1564			2		2
132	000476	3000	4				4
133	000432	5836	6			1	7
134	000465	4072	10	1			11
135	000433	5576	3	1		1	5
136	000445	7049					
137	000472	4962					
138	000470	5241	15	2	3		20
139	000429	6658	5	2	1		8
140	000429	4045			3		3
TOTALS:		110371	122	15	19	2	158
XM16E1							
101	156076	5226	80	12	2		94
102	154065	5638	40	3	2		45
103	153691	4542	59	8		2	69
104	153299	5868	76	7	4		87
105	153492	5299	87	7	4		98
106	153809	5198	69	4	3		76
107	156266	4539	43	1	2		46
108	154911	4956	40		2		42
109	148537	4631	29			1	30
110	145774	5450	48	2	6		56
111	148007	4493	82	7	6		95
112	124508	5093	51	4	4		59
113	142902	4463	50	2	6		58
114	147663	4438	21		1		22
115	147064	4462	69	10			79
116	148500	3732	80		2	1	83
117	148057	4862	60	4	4		68
118	155495	4036	63	1	2		66
119	148497	4154	42	1	2	1	46
120	145879	4640	51	1	3		54
TOTALS:		95720	1140	74	55	5	1274

LEGEND: \*Category defined (ref para 2.16.2.1.2)

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DEPARTMENT OF THE ARMY  
UNITED STATES ARMY INFANTRY BOARD  
Fort Benning, Georgia 31905

STEB-C-SA (P-3110)

4 JAN 1966

SUBJECT: Approved Service Test Report for Small Arms Weapons Systems  
(SAWS), USATECOM Project No. 8-5-0400-04 (U)

TO: See Distribution

(U) Subject document is forwarded for information and retention.

FOR THE PRESIDENT:

2 Incl

1. USATECOM Action Letter
2. Approved S/T Report

*Ruth M. Haerr*

RUTH M. HAERR  
Major WAC  
Adjutant

DISTRIBUTION:

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DEPARTMENT OF THE ARMY  
HEADQUARTERS, U.S. ARMY TEST AND EVALUATION COMMAND  
ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-BC

29 Dec 65

SUBJECT: Reports of Engineering, Service, and Service-Type Tests of  
Small Arms Weapons Systems (SAWS) (USATECOM Project Nos.  
8-5-0400-03 Through 8-5-0400-06)

TO: Commanding General, US Army Weapons Command, ATTN: AMCPM-RS,  
Rock Island, Illinois 61200  
Commanding General, US Army Combat Developments Command, ATTN:  
USACDC Liaison Officer, USATECOM, Aberdeen Proving Ground,  
Maryland 21005

1. References:

a. Headquarters Department of the Army, Chief of Staff Memorandum No. 64-555, 17 Dec 64, subj: Army Small Arms Weapons Systems (Class CONF).

b. Ltr, Hq USAMC (AMCPM-RS), 28 Apr 65, subj: Army Small Arms Weapons Systems (SAWS) (U) (Class CONF).

c. TT, USAWECOM 19371, 15 Dec 65.

2. Forwarded herewith are reports of tests of Army Small Arms Weapons Systems (SAWS) which were conducted by the US Army Test and Evaluation Command in accordance with the requirements of references 1a and 1b.

3. The Report of Engineering Test (Incl 1) is partial because testing is still in progress. A final report of engineering test covering those tests still in progress will be forwarded when available.

4. These reports are forwarded for information and to meet the deadlines established for the SAWS Program. A Headquarters USATECOM position with respect to these reports and their conclusions and recommendations will be provided upon completion of detailed analysis, now in progress; pending completion of this analysis, addressees are cautioned in the use of certain of the data presented for the reasons indicated below.-

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*Incl 1*

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AMSTE-BC

29 Dec 1965

SUBJECT: Reports of Engineering, Service, and Service-Type Tests of  
Small Arms Weapons Systems (SAWS) (USATECOM Project Nos.  
8-5-0400-03 Through 8-5-0400-06)

a. Tactical Firing Exercises (USA Infantry Board Report).- The results obtained in tests of this nature are primarily dependent upon human performance; troop samples should be matched in size and quality, and test conditions should be identical for each weapon insofar as possible. However, although every effort was made, it was not possible to maintain optimum controls in SAWS testing due to circumstances that were largely unavoidable and beyond the control of the test agency.

(1) Weapons were not available in uniform quantity, and in some cases were delivered after testing had been initiated, because of contractor inability to meet the desired schedule. In consequence, the size of troop samples varied and in some instances the learning factor could not be kept equal for all weapons.

(2) Delays and suspensions imposed on the test agency for safety considerations and/or because of weapon malfunctioning resulted in some variance in test conditions.

b. Reliability and Durability (Engineering and Service Test Reports).-Weapons tested varied from some which have been in production for several years to others which are in an early stage of development. Data bearing upon reliability and durability must be carefully analyzed to correlate Engineering and Service Test results and to determine, where possible, whether malperformances are considered to be correctable in future development or reflect basic design deficiencies.

c. Ammunition (Engineering and Service Test Reports).-In SAWS test ammunition of "average" quality, representative of that available for issue to troops, was used. In testing it was found that occasional unacceptable wide dispersion was obtained with the 7.62mm M80 ball cartridge, and that the 5.56mm M193 ball cartridge apparently contributed to relatively low functional reliability of some weapons. The degree to which ammunition contributed to these results must be analyzed in detail.

5. This Headquarters, in coordination with the USA Ballistic Research Laboratories, the USA Human Engineering Laboratories, and other agencies, is presently conducting the necessary analysis to determine whether and to what degree, SAWS test results were affected by the factors

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29 Dec 1965

SUBJECT: Reports of Engineering, Service, and Service-Type Tests of  
Small Arms Weapons Systems (SAWS) (USATECOM Project Nos.  
8-5-0400-03 Through 8-5-0400-06)

enumerated above. It is expected that this analysis will be forwarded on  
or before 31 January 1966.

FOR THE COMMANDER:

4 Incl	/s/ AUSTIN TRIPLET, JR.
	/t/ AUSTIN TRIPLET, JR.
1. Proj No. 8-5-0400-03 (APG)	Colonel GS
(Partial Report)	Dir, Inf Mat Test
2. Proj No. 8-5-0400-04 (USAIB)	
3. Proj No. 8-5-0400-05 (USAAB)	
4. Proj No. 8-5-0400-06 (USA Avn Test Bd)	
(AMCPM-RS, w/5 cys ea incl)	
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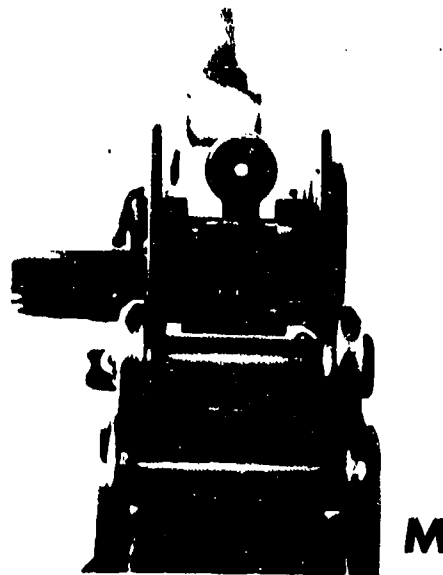


Figure 13

Sights - Rifle, 5.56-mm, S-R

M. Rear view of rear sight

N. Top rear view of front sight

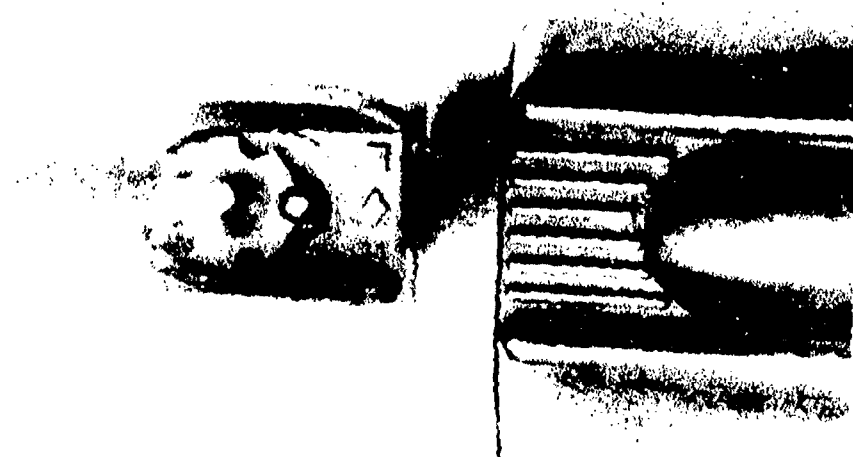
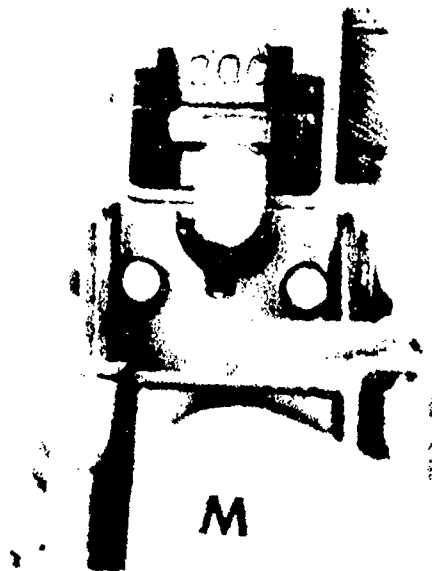


Figure 14

Sights - Rifle, 5.56-mm, XM16E1

M. Rear view of rear sight

N. Top rear view of front sight



**N**  
Figure 15

Sights - Rifle, 5.56-mm, A-R

M. Rear view of rear sight

N. Top view of front sight

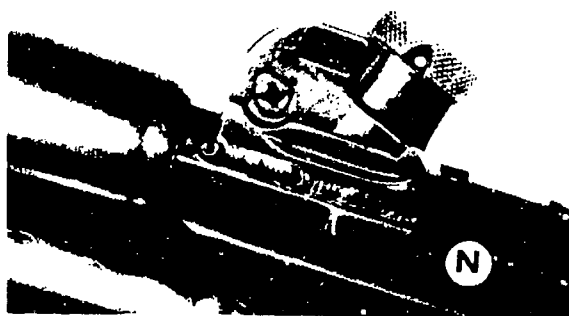
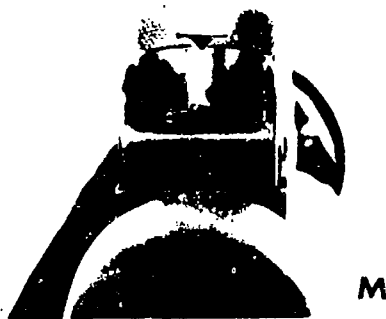


Figure 16

Sights - Rifle, 5.56-mm, H-R

- M. Rear view of rear sight
- N. Right side view of rear sight
- O. Top front view of front sight

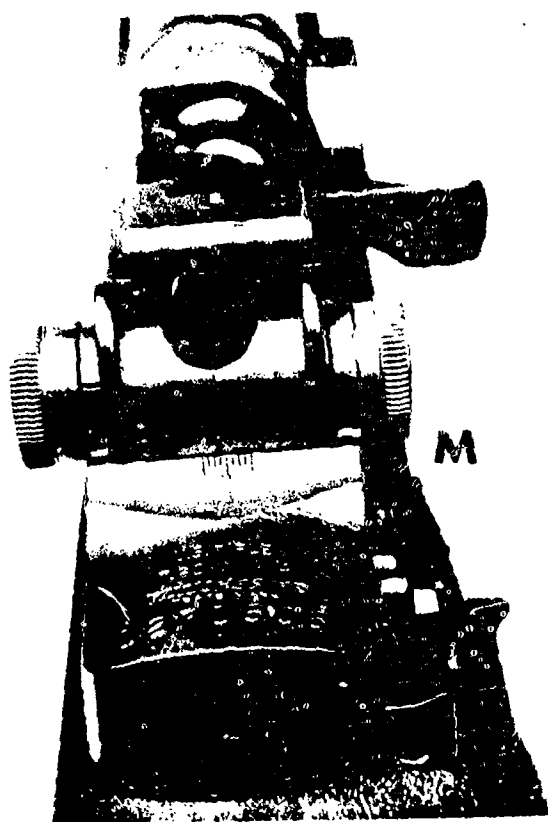


Figure 17

Sights - Rifle, 7.62-mm, M14E2

M. Rear view of rear sight

N. Top view of front sight

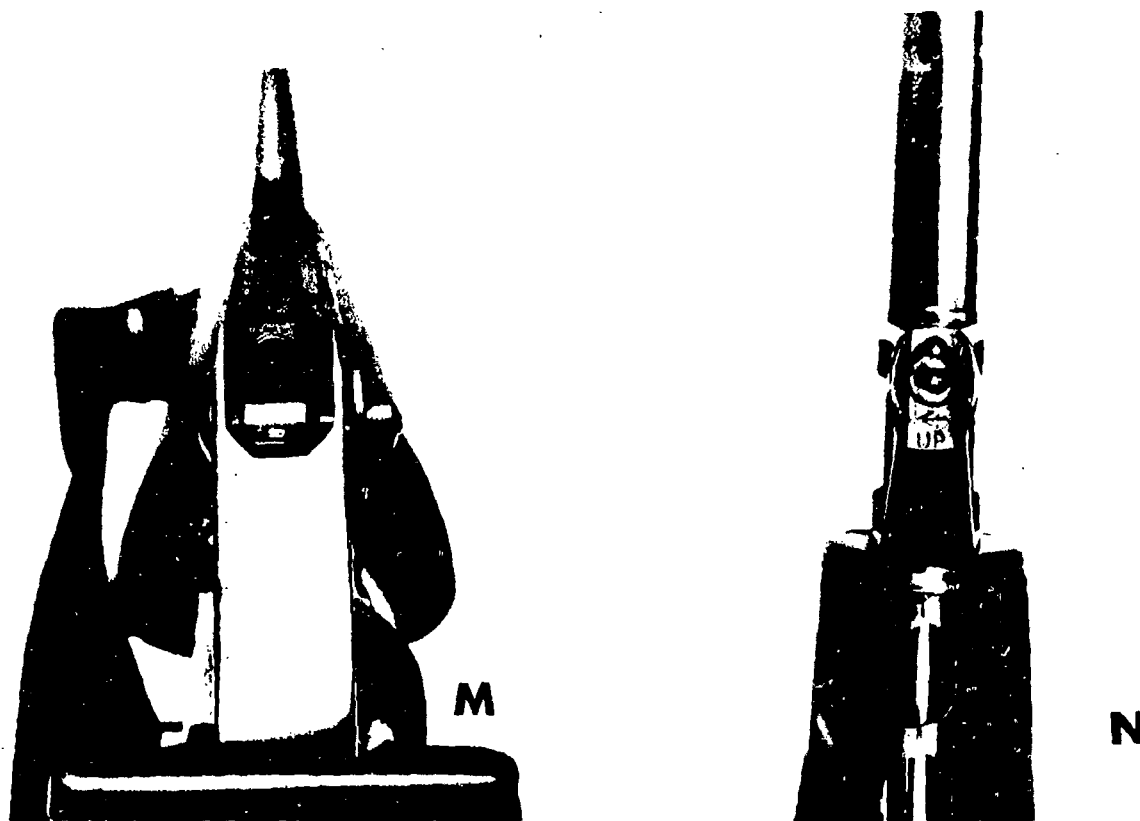


Figure 18

Sights - Rifle, 5.56-mm, C-AR

M. Rear view of rear sight

N. Top view of front sight

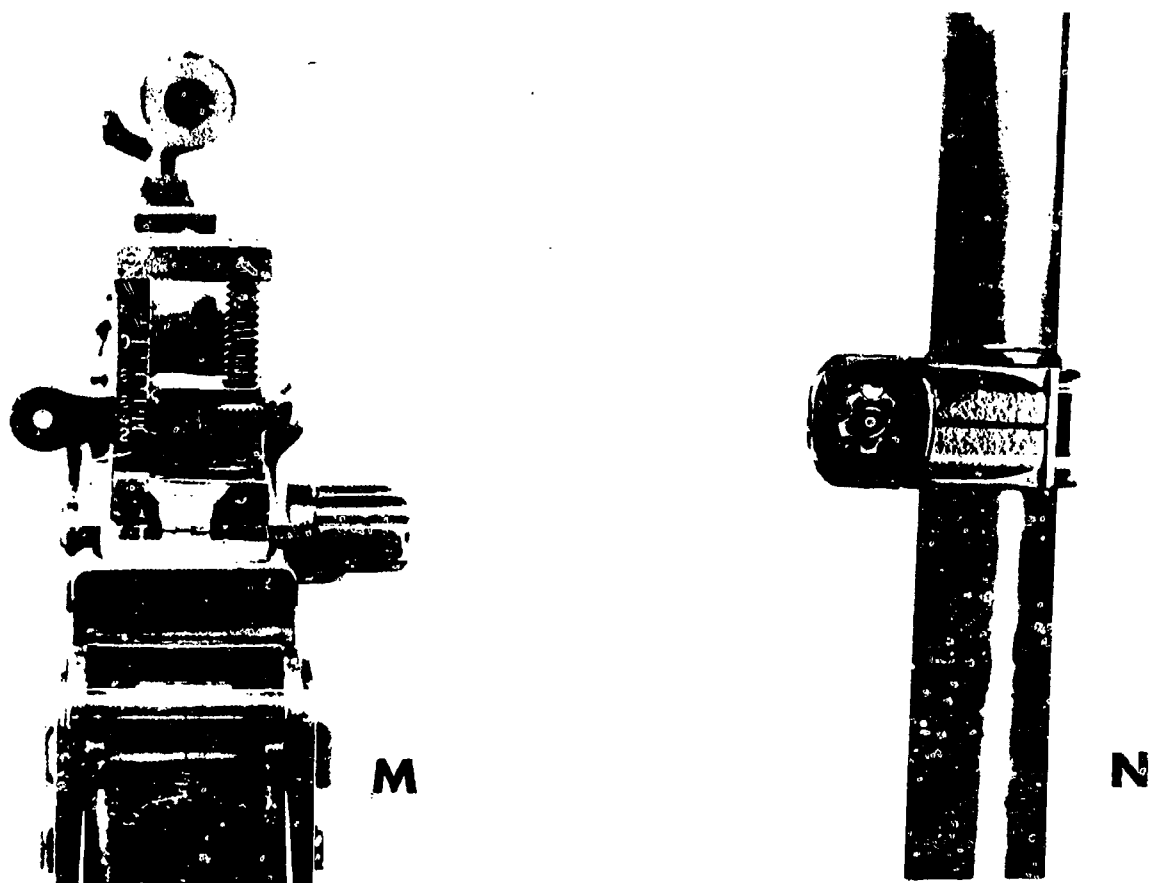


Figure 19

Sights - Rifle, 5.56-mm, S-AR

M. Rear view of rear sight

N. Top view of front sight



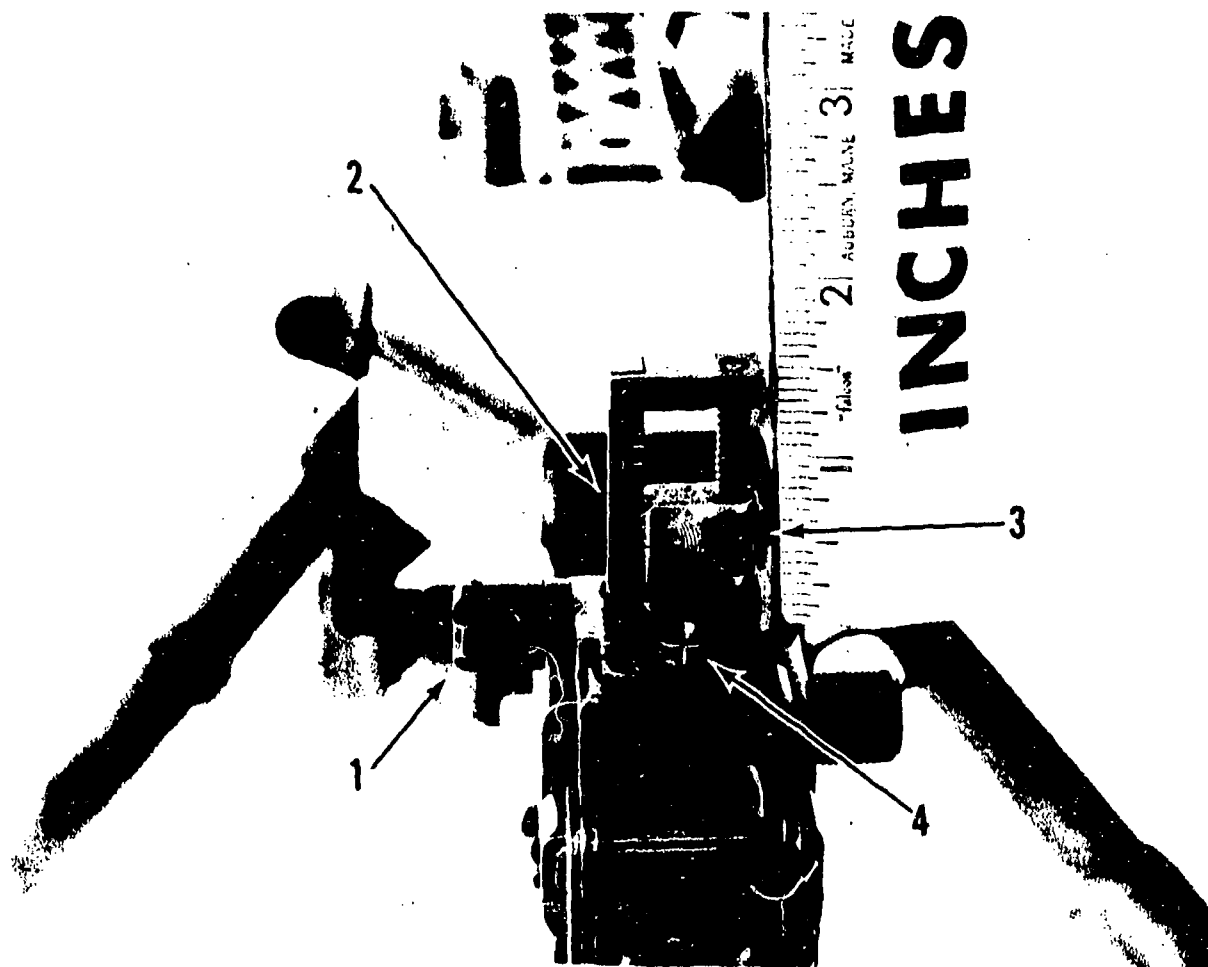
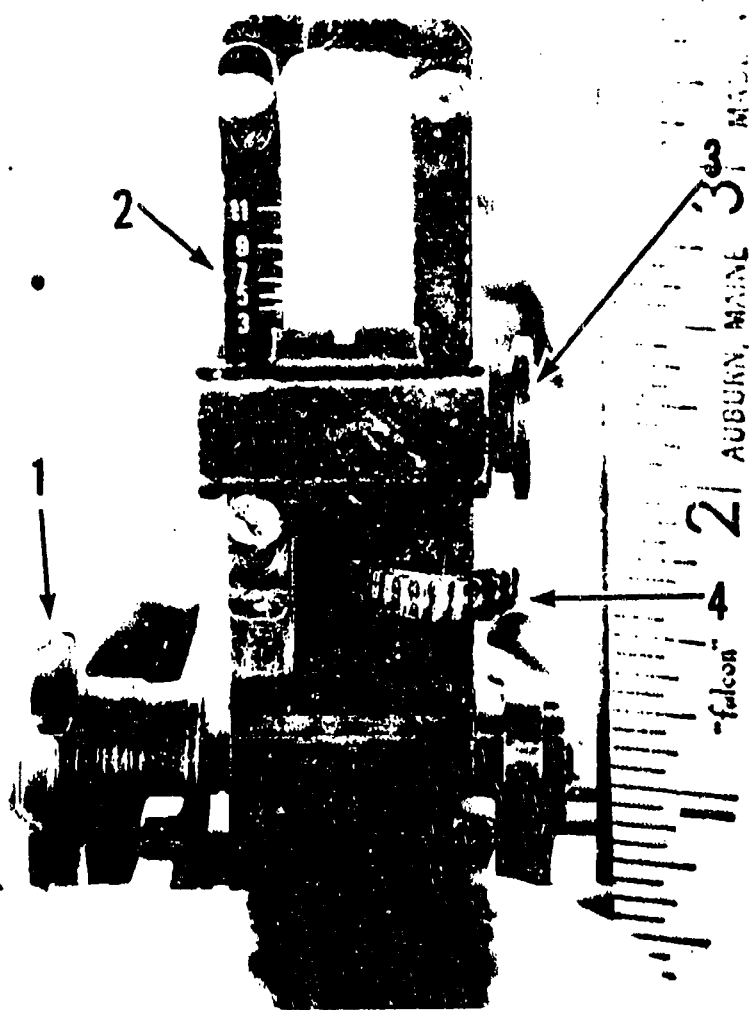


Figure 20

Rear Sight Assembly of Machine Gun, 5.56-mm, Code S

1. Windage Knob.
2. Range Scale.
3. Range Elevation Knob.
4. Battle Sight.

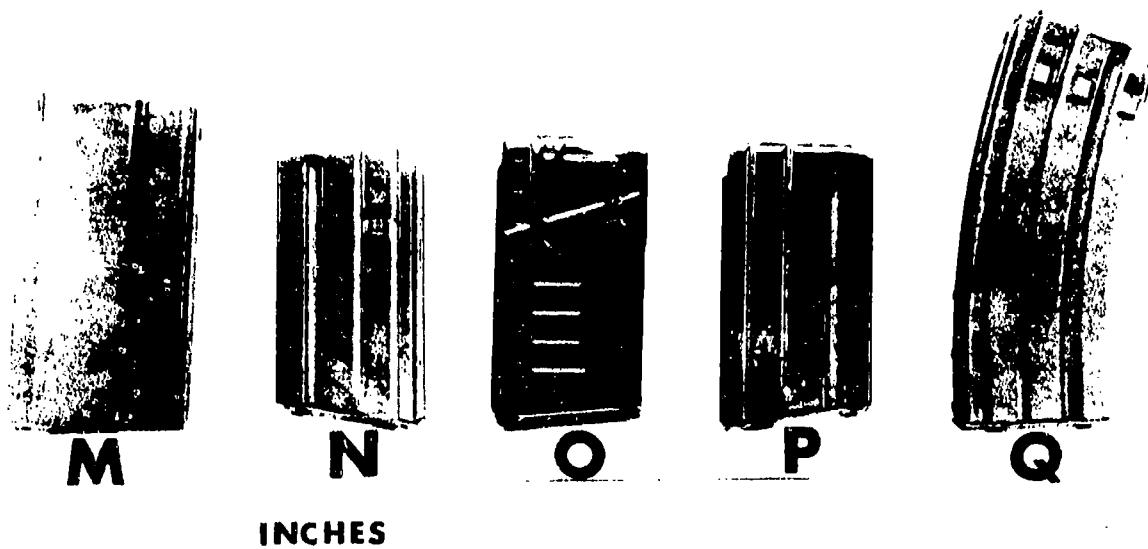


**INCHES**

Figure 21

Rear Sight Assembly of Machine Gun, 7.62-mm, M60

1. Windage Knob.
2. Range Scale.
3. Elevation Release Assembly.
4. Range Elevation Knob.



**Figure 22**

**Magazines**

- M. Rifle, 7.62-mm, M14.
- N. Rifle, 5.56-mm, XM16E1.
- O. Rifle, 5.56-mm, H-R
- P. Rifle, 5.56-mm, A-R
- Q. Rifle, 5.56-mm, S-R

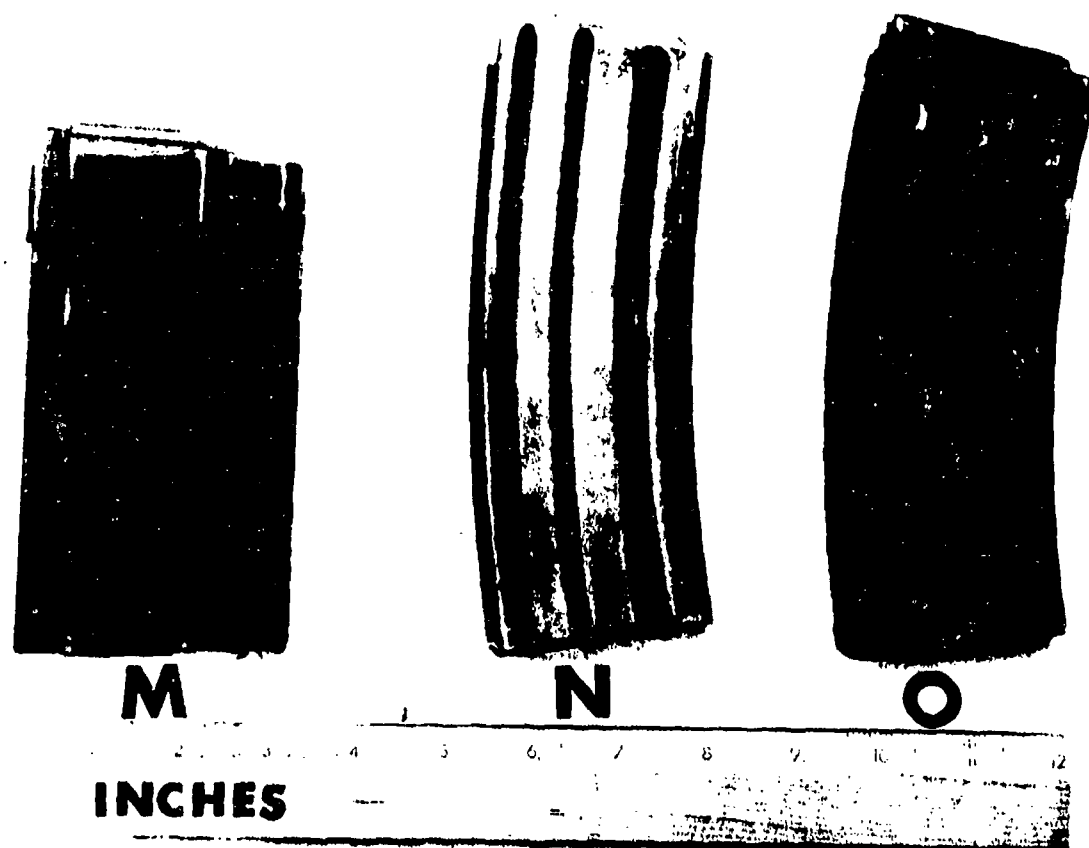


Figure 23

Magazines

- M. Rifle, 7.62-mm, M14E2.
- N. Rifle, 5.56-mm, C-AR.
- O. Rifle, 5.56-mm, S-AR.

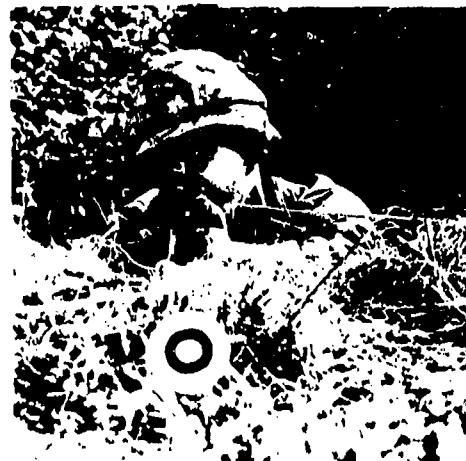


Figure 24

Signature Characteristics  
(Firer in the Standing Foxhole Position - Without Bipods)

M. Rifle, 7.62-mm, M14	
N. Rifle, 5.56-mm, S-R	O. Rifle, 5.56-mm, XM16E1
P. Rifle, 5.56-mm, H-R	Q. Rifle, 5.56-mm, A-R



Figure 25

Signature Characteristics  
(Firer in the Standing Foxhole Position - With Bipods)

M. Rifle, 7.62-mm, M14	
N. Rifle, 5.56-mm, S-R	O. Rifle, 5.56-mm, XM16E1
P. Rifle, 5.56-mm, H-R	Q. Rifle, 5.56-mm, A-R



Figure 26

Signature Characteristics  
(Firer in the Standing Foxhole Position - Without Bipods)

M. Rifle, 7.62-mm, M14  
N. Carbine, 5.56-mm, S-C      O. Carbine, 5.56-mm, C-SMG

V-26

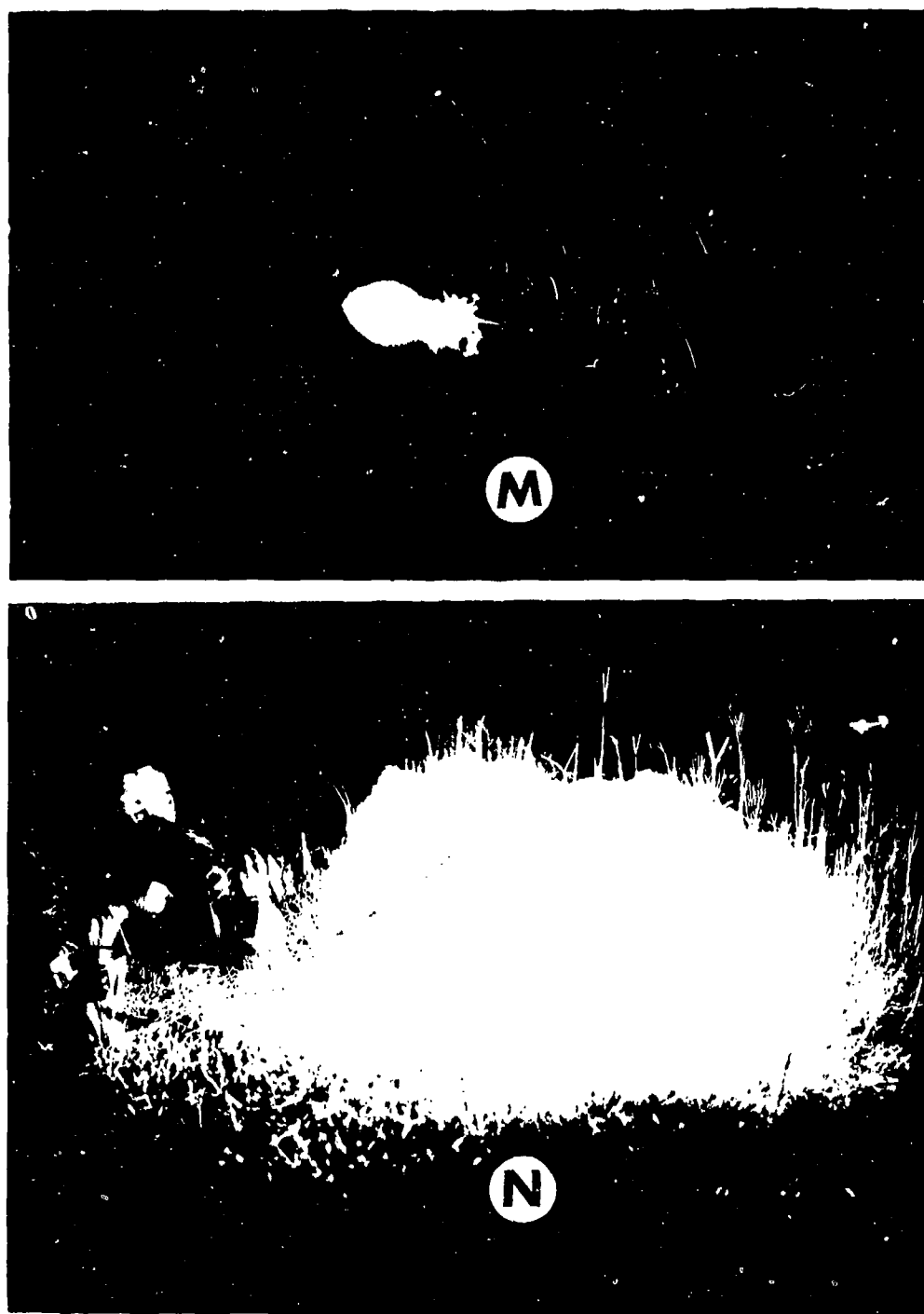


Figure 27

Signature Characteristics

- M. Rifle, 5.56-mm, C-SMG, firing one Cartridge, Ball, 5.56-mm, M193.
- N. Rifle, 5.56-mm, S-SMG, firing a burst of three Cartridges, Ball, 5.56-mm, M193.





Figure 28

Signature Characteristics  
(Firer in the Standing Foxhole Position)

- M. Rifle, 7.62-mm, M14E2.
- N. Rifle, 5.56-mm, C-AR.
- O. Rifle, 5.56-mm, S-AR.



Figure 29

Signature Characteristics

Muzzle flash of the Rifle, 7.62-mm, M14E2,  
firing one Cartridge, Tracer, 7.62-mm, M62.

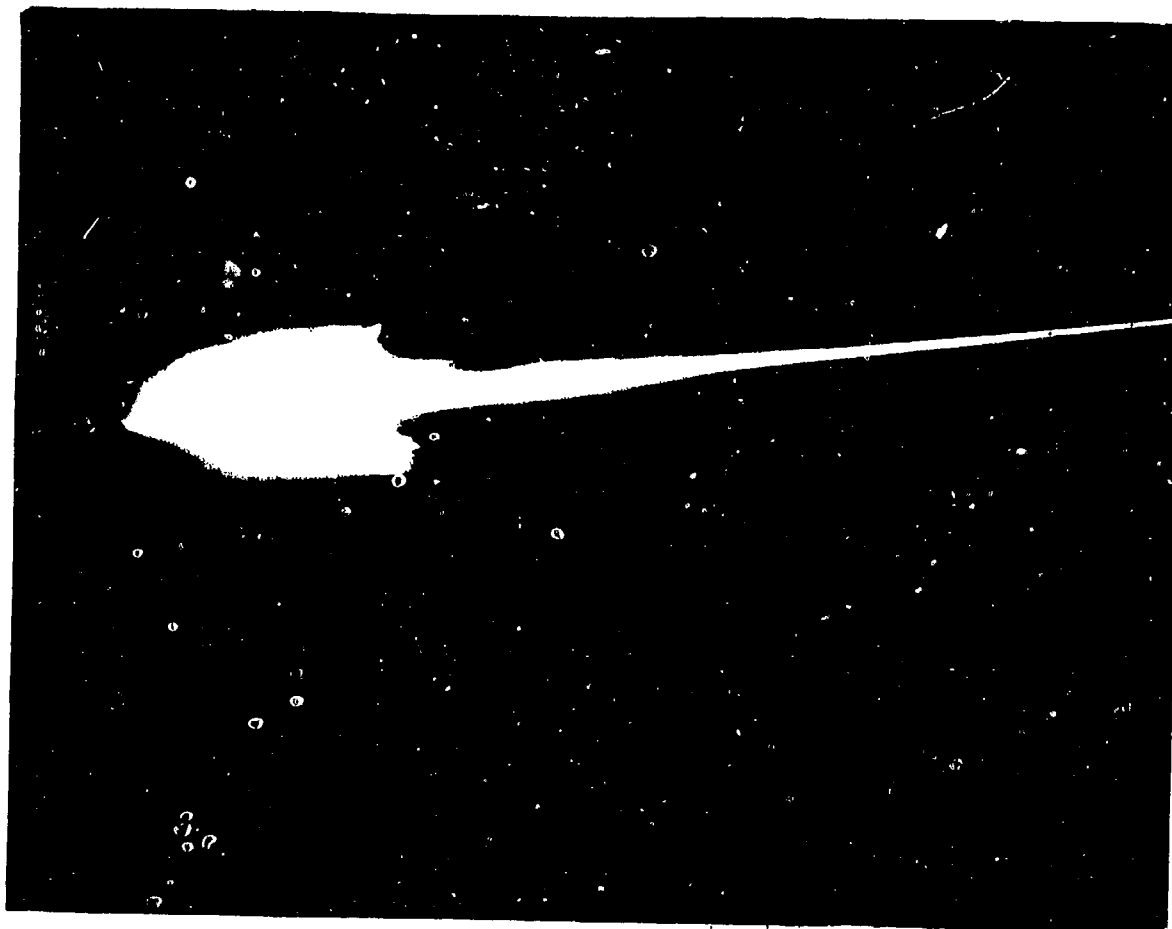


Figure 30

Signature Characteristics

Muzzle flash of the Rifle, 5.56-mm, C-AR  
firing one Cartridge, Tracer, 5.56-mm, M196.



Figure 31

Signature Characteristics

Muzzle flash of the Rifle, 5.56-mm, M16, firing one Cartridge, Tracer, 5.56-mm, M196.

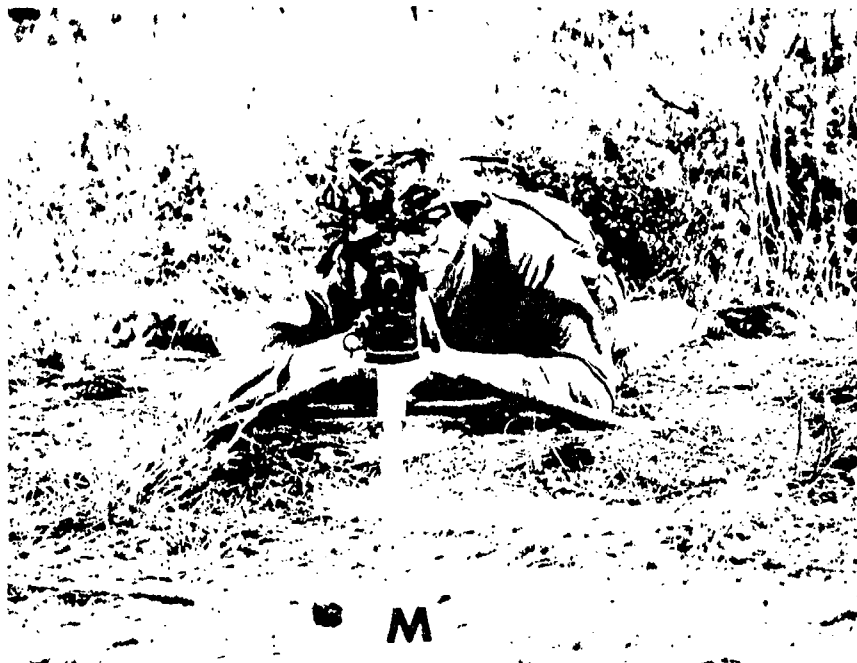


Figure 32

Signature Characteristics  
(Firer in the Prone Position)

- M. Machine Gun, 5.56-mm, S-MMG
- N. Machine Gun, 7.62-mm, M60 (MMG)



Figure 33

Signature Characteristics

(Firer in the Prone Position)

- M. Machine Gun, 5.56-mm, S-LMG
- N. Machine Gun, 7.62-mm, M60 (LMG)



Figure 34

Signature Characteristics  
(Firer in the Standing Foxhole Position)

- M. Machine Gun, 5.56-mm, S-LMG
- N. Machine Gun, 7.62-mm, M60 (LMG)



Figure 35

Signature Characteristics  
(Firer in the Standing Foxhole Position)

- M. Machine Gun, 5.56-mm, S-MMG
- N. Machine Gun, 7.62-mm, M60 (MMG)

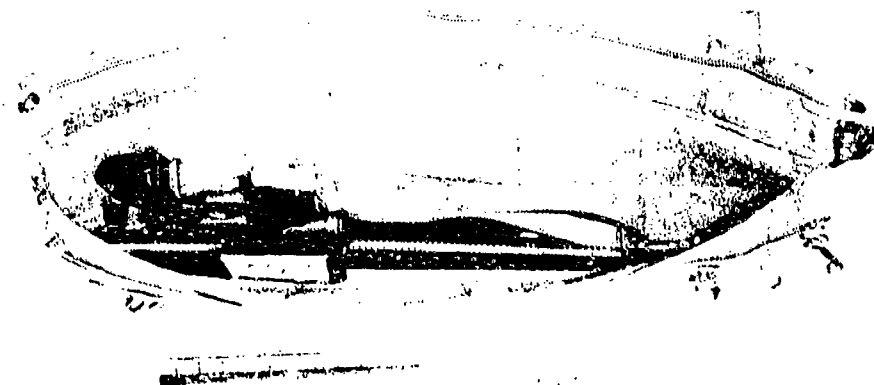




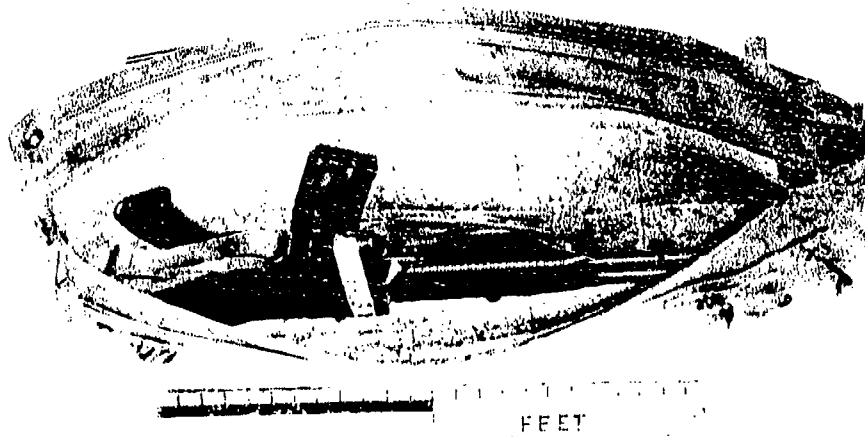
Figure 36

Signature Characteristics

- M. Machine Gun, 7.62-mm, M60, firing a burst of six Cartridges, Tracer, 7.62-mm, M62.
- N. Machine Gun, 5.56-mm, Code S, firing a burst of six Cartridges, Tracer, 5.56-mm, M196.



**M**

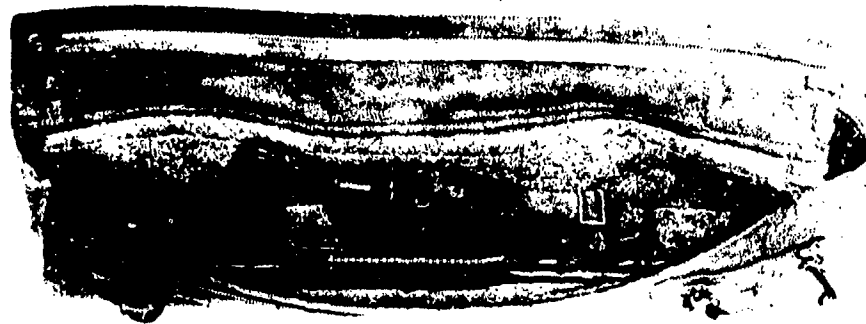


**N**

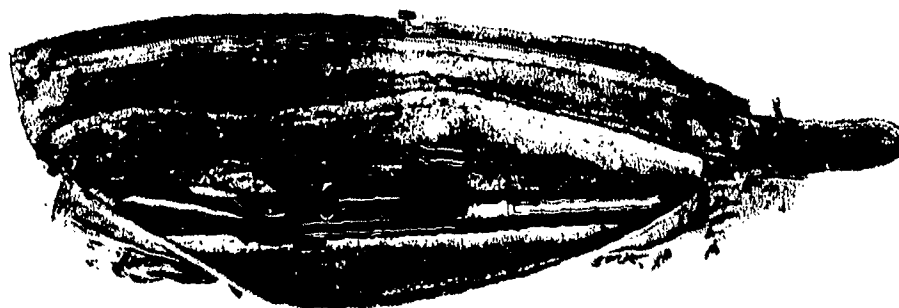
**Figure 37**

**Aerial Delivery**

- M. Rifle, 5.56-mm, A-R (Butt Stock Assembly folded), in Case, Individual Weapon, Parachutist.
- N. Rifle, 5.56-mm, S-R (Stock Assembly folded), in Case, Individual Weapon, Parachutist.



**M**



**N**

Figure 38

Aerial Delivery

- M. Rifle, 5.56-mm, S-R (Stock Assembly detached), in Case, Individual Weapon, Parachutist.
- N. Rifle, 5.56-mm, H-R, in Case, Individual Weapon, Parachutist.



Figure 39

Aerial Delivery

Individual Parachutist rigged with the Case, Individual  
Weapon, Parachutist, for delivery of rifles, carbines,  
or automatic rifles, with appropriate ammunition.



Figure 40

Individual Parachutist rigged with the Rifle, 5.56-mm, XM16E1.

1. Forward assist assembly padded and taped.
2. Lower tie-down.
3. Magazine taped to rifle.
4. Upper tie-downs to diagonal back strap and Main Lift Web.
5. Muzzle and Front Sight Assembly taped.



Figure 41

Individual Parachutist rigged with the Rifle, 5.56-mm, S-R.

1. Stock Assembly taped to Receiver Group.
2. Magazine taped to rifle.
3. Upper Tie-downs to Diagonal Back Strap and Main Lift Web.
4. Muzzle and Front Sight Assembly taped.
5. Sling, passed between Barrel and Gas Cylinder.



Figure 42

Aerial Delivery

Individual Parachutist rigged with the Rifle, 5.56-mm, H-R

1. Lower tie-down
2. Magazine taped to rifle.
3. Upper tie-downs to Diagonal Back Strap and Main Lift Web.
4. Muzzle and Front Sight Assembly taped.



Figure 43

Individual Parachutist rigged with the Rifle, 5.56-mm, A-R

1. Lower Receiver Weld and Rivet Assembly with Pistol Grip and Butt Stock Assembly taped at junction.
2. Sling looped around rifle.
3. Upper Tie-downs to Diagonal Back Strap and Main Lift Web.
4. Muzzle and Front Sight taped.



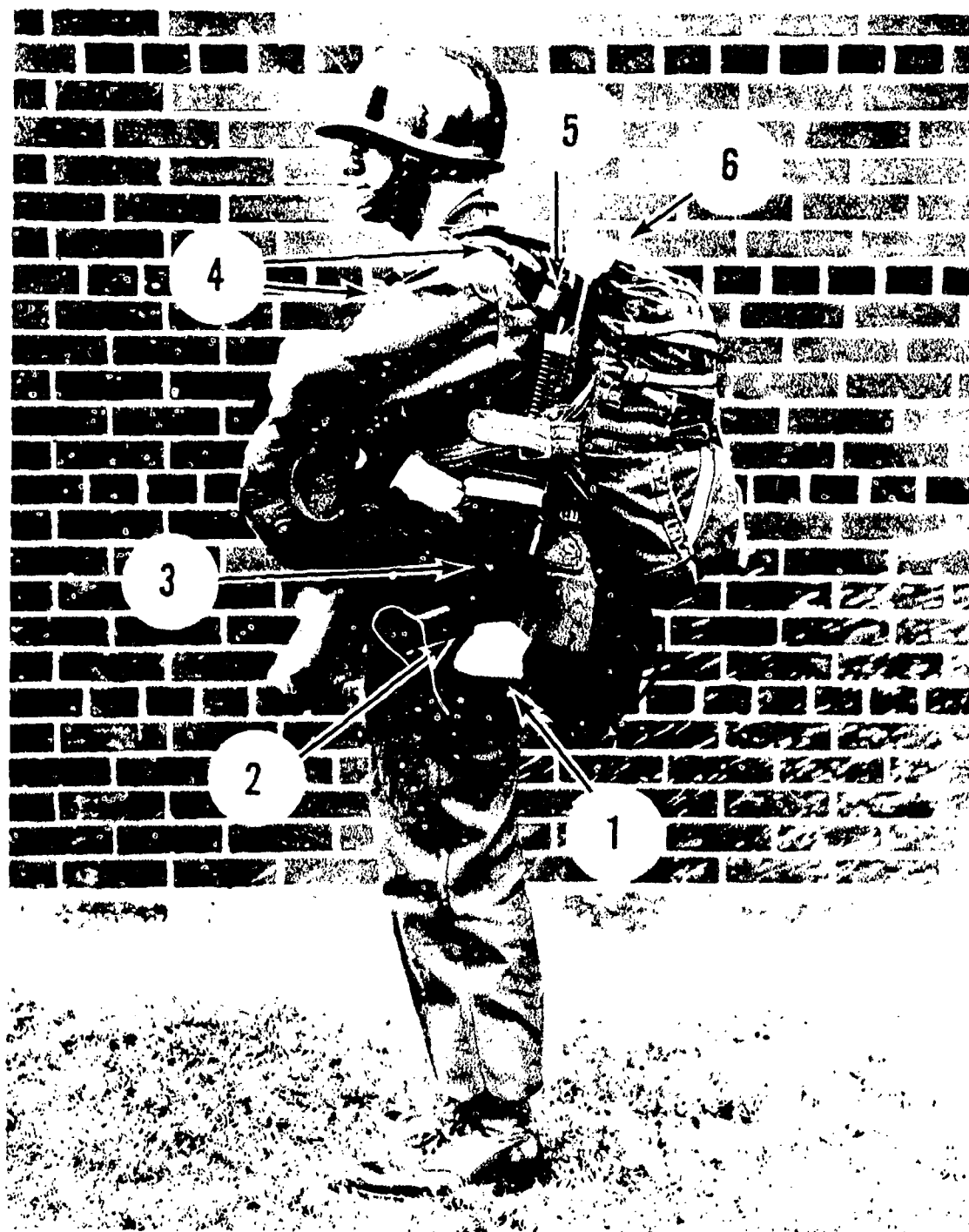


Figure 44

Individual Parachutist rigged with the Carbine, 5.56-mm, S-C

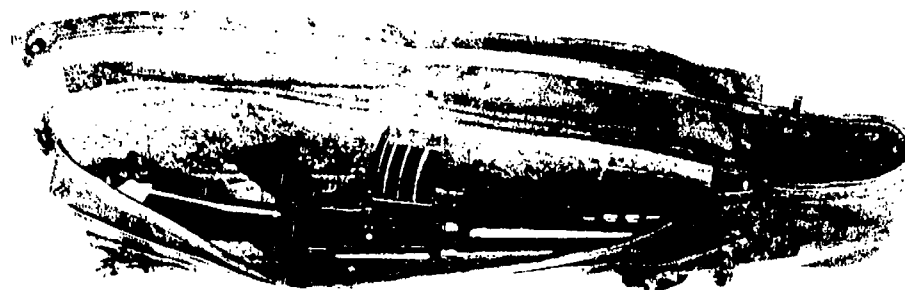
1. Receiver Group and Stock Assembly taped at junction.
2. Sling Loop around Receiver Group and Stock Assembly.
3. Stock Assembly in folded position.
4. Upper Tie-downs to Diagonal Back Strap and Main Lift Web.
5. Sling looped around barrel.
6. Muzzle and Front Sight Assembly taped.



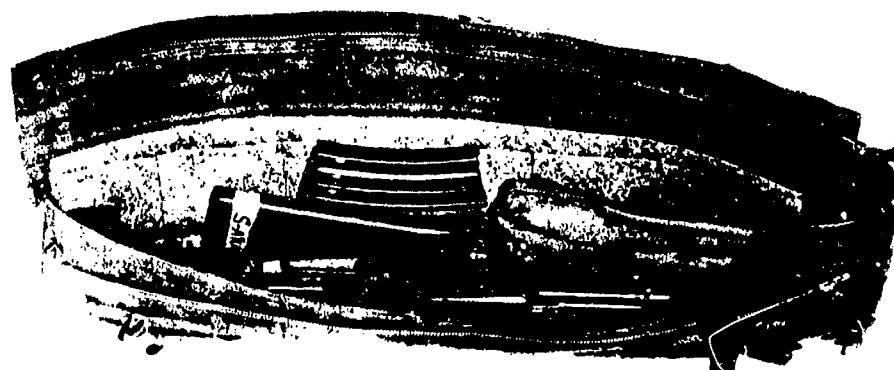
Figure 45

Individual Parachutist rigged with the Carbine, 5.56-mm, C-SMG

1. Magazine taped to carbine.
2. Upper Tie-downs to Diagonal Back Strap and Main Lift Web.
3. Muzzle and Front Sight Assembly taped.
4. Forward Assist Assembly padded and taped.



**M**

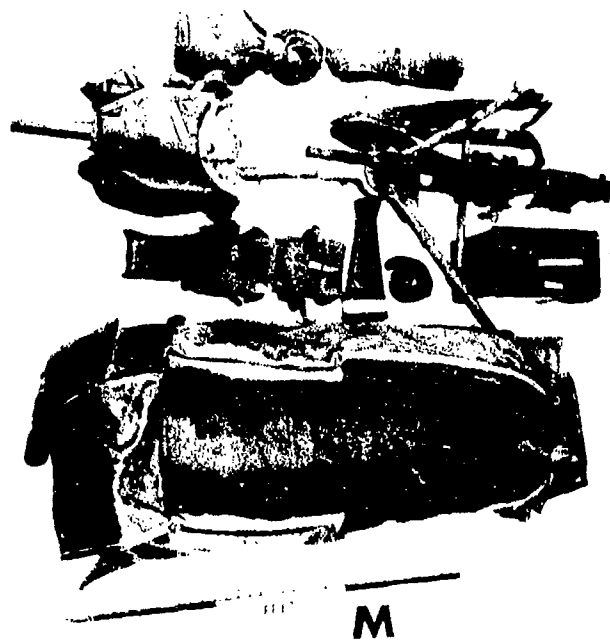


**N**

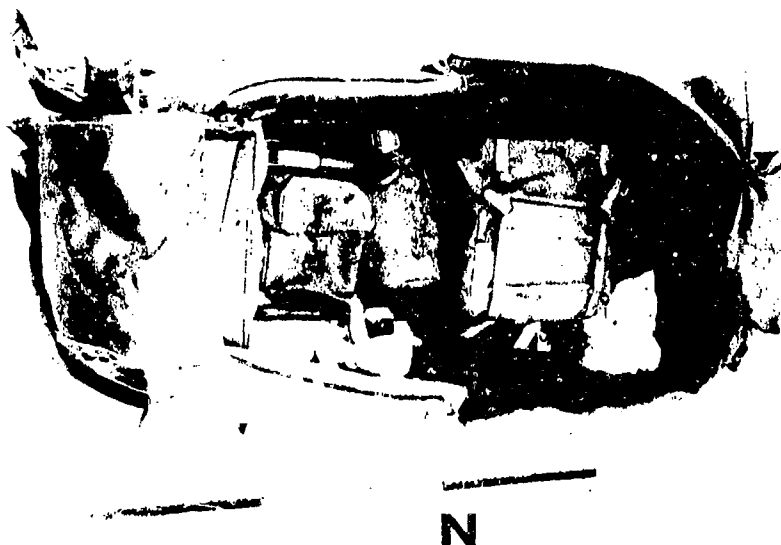
Figure 46

Aerial Delivery

- M. Rifle, 5.56-mm, C-AR in Case, Individual Weapon, Parachutist.
- N. Rifle, 5.56-mm, S-AR (Butt Stock Assembly detached), in Case, Individual Weapon, Parachutist.



M



N

Figure 47

#### Aerial Delivery

- M. Machine Gun, 5.56-mm, S-MMG, with Ammunition and Individual Equipment over the Parachutist Adjustable Equipment Container, prepared for rigging.
- N. Machine Gun, Ammunition, and Equipment in the Parachutist Adjustable Equipment Container.



Figure 48

Aerial Delivery

Individual Parachutist rigged with the Parachutist Adjustable Equipment Container for delivery of the Machine Gun, 7.62-mm, M60, or the Machine Gun, 5.56-mm, Code S, and appropriate ammunition and individual equipment.

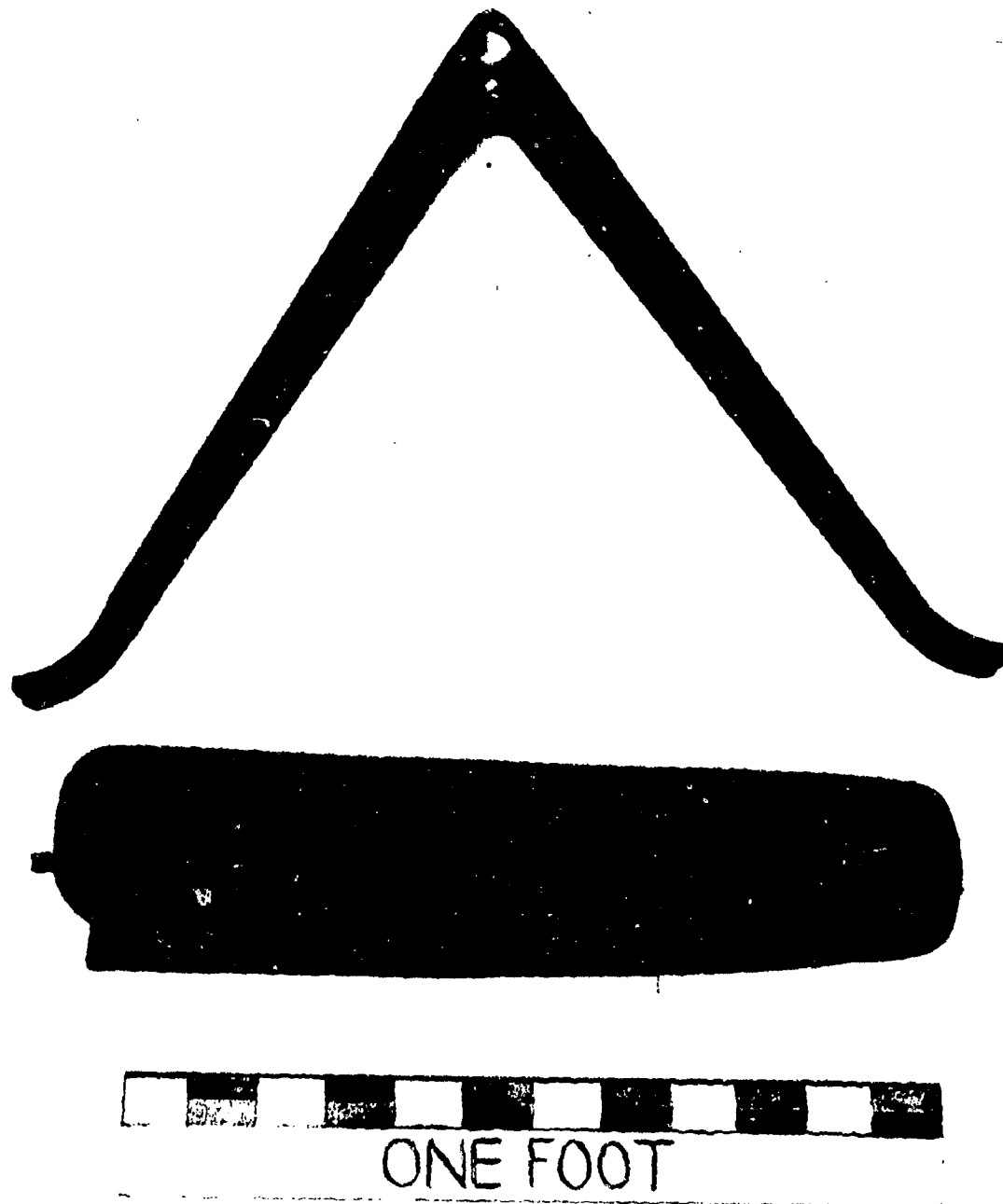


Figure 49  
Rifle Bipod, M3, and Bipod Case.

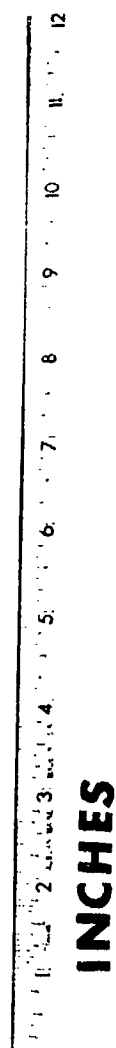
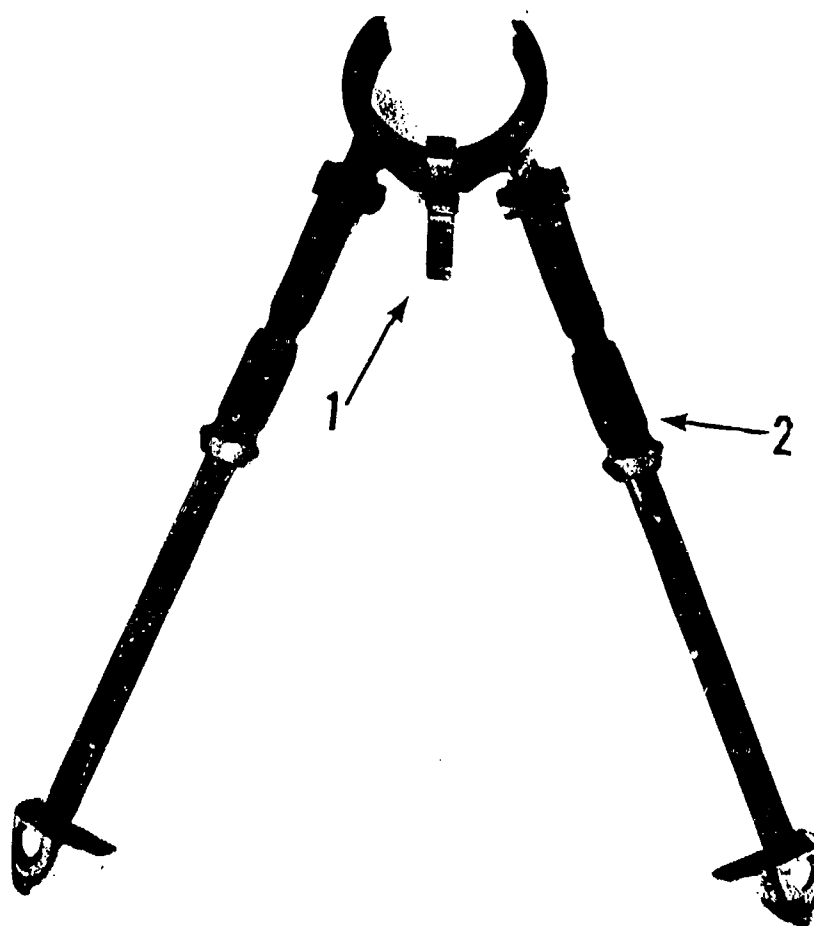


Figure 50  
Bipod of Rifle, 5.56-mm, H-R

1. Locking Latch.
2. Retracting Sleeve.

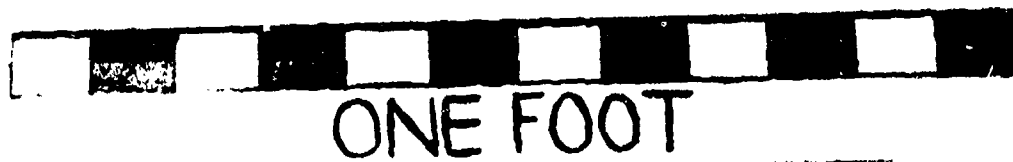
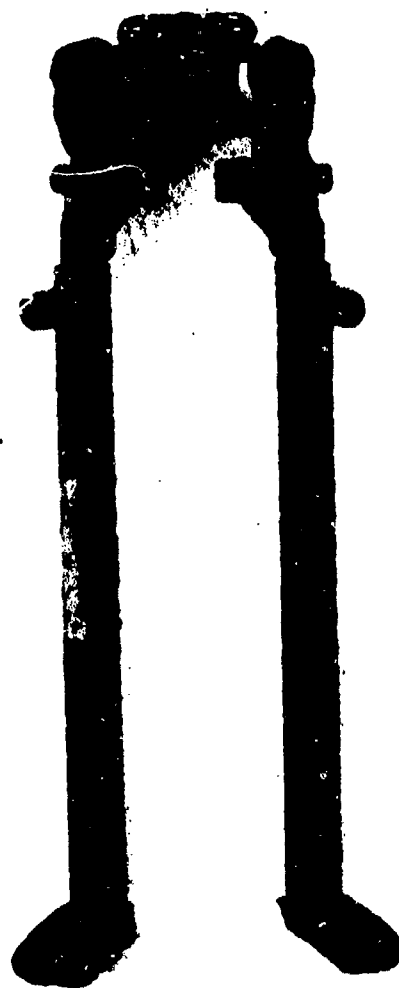


Figure 51  
Rifle Bipod, M2 (Modified).



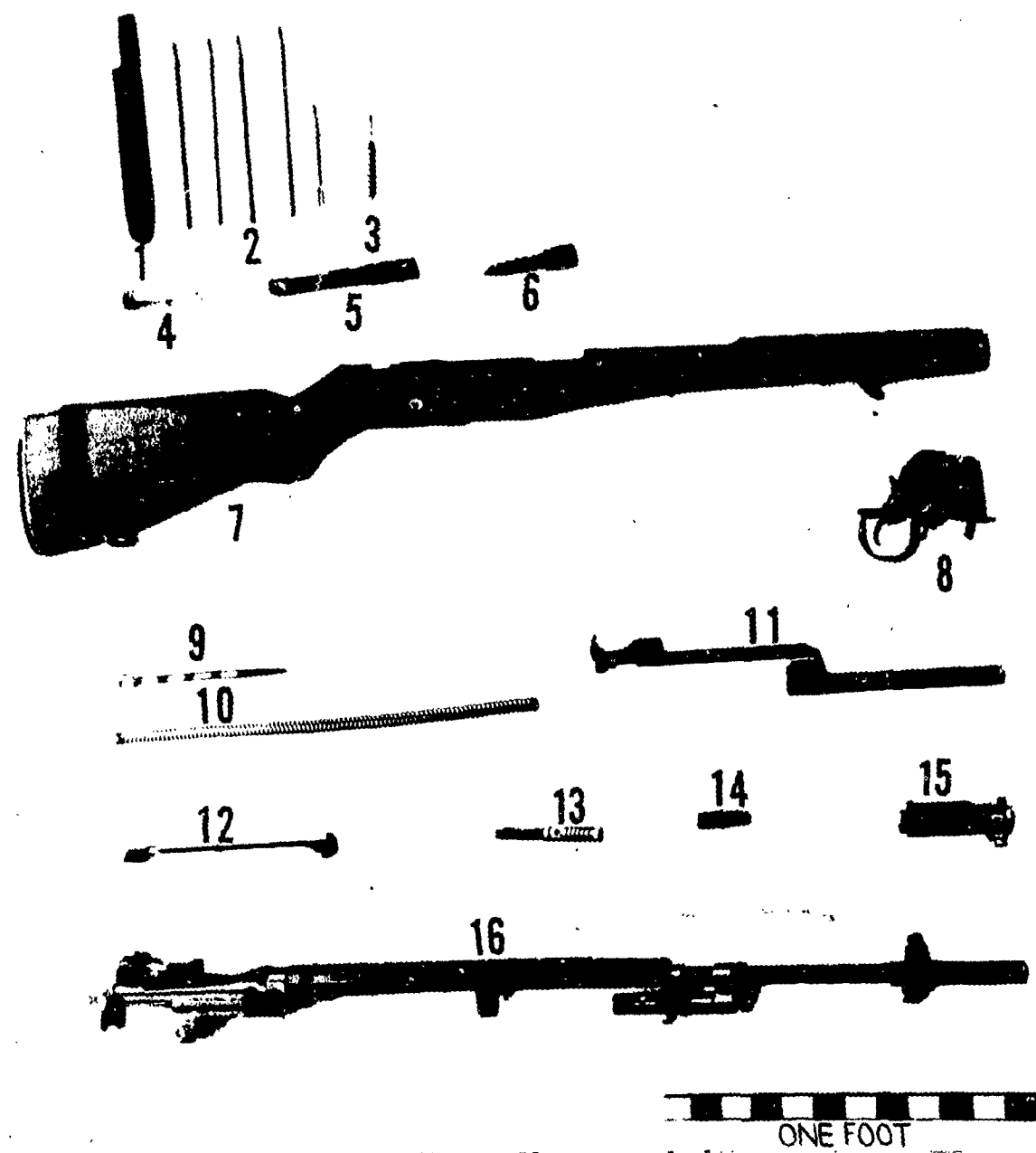


Figure 52

Rifle, 7.62-mm, M14

- |                          |                           |                          |
|--------------------------|---------------------------|--------------------------|
| 1. Cleaning Rod Case.    | 7. Stock with Butt        | 12. Connector Assembly.  |
| 2. Cleaning Rod Sections | Plate Assembly.           | 13. Gas Cylinder Piston. |
| and Swab Holder.         | 8. Firing Mechanism.      | 14. Gas Cylinder Plug.   |
| 3. Bore Brush.           | 9. Operating Rod Spring   | 15. Breech Bolt.         |
| 4. Case, Lubricant.      | Guide.                    | 16. Barrel and Receiver  |
| 5. Combination Tool.     | 10. Operating Rod Spring. | Group.                   |
| 6. Chamber Brush.        | 11. Operating Rod.        |                          |

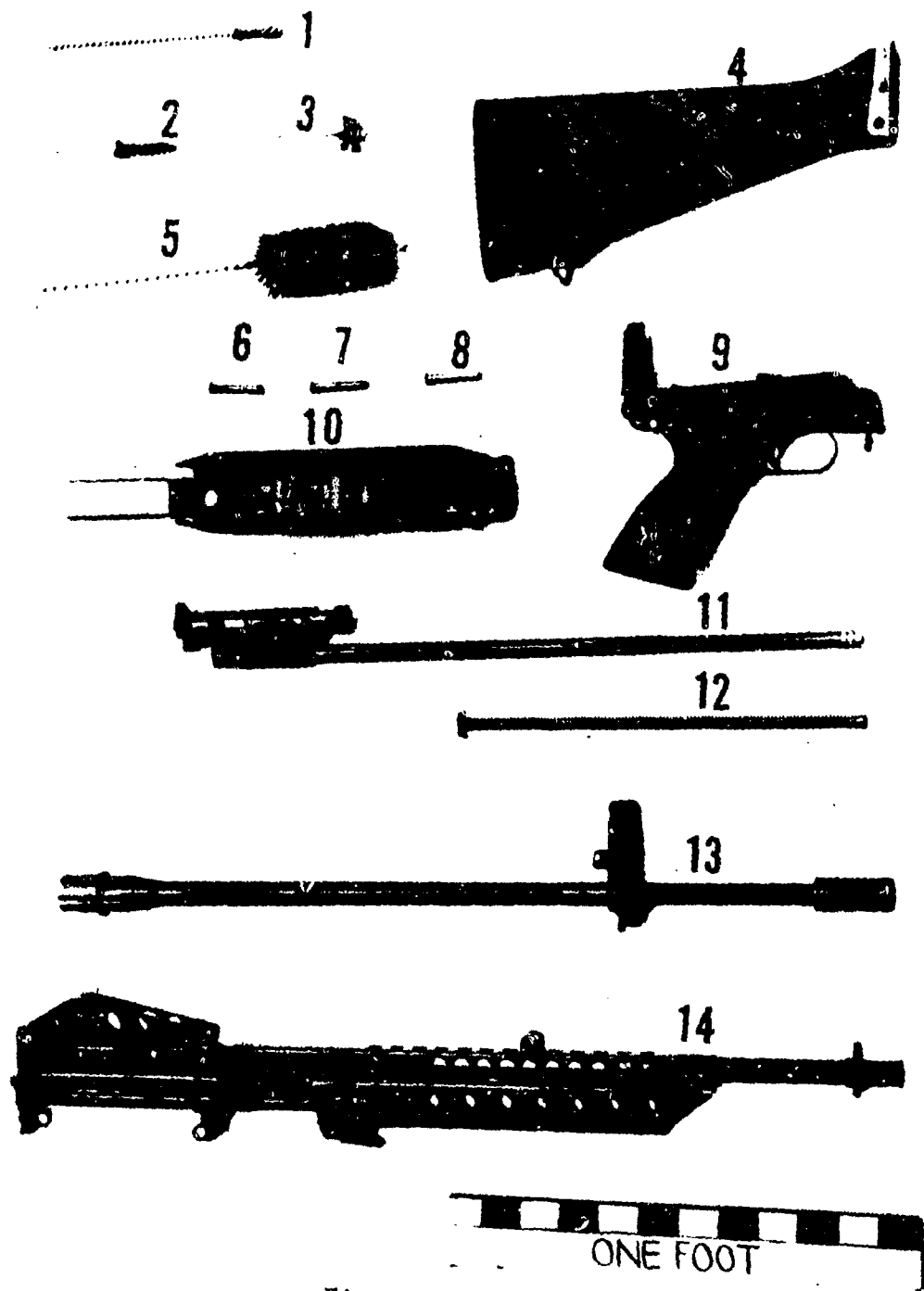


Figure 53

Rifle, 5.56-mm, S-R

- |                        |                               |                                  |
|------------------------|-------------------------------|----------------------------------|
| 1. Gas Cylinder Brush. | 6. Forestock Assembly Pin.    | 11. Carrier and Piston Assembly. |
| 2. Chamber Brush.      | 7. Trigger Housing Group Pin. | 12. Driver Spring.               |
| 3. Locking Lug Brush.  | 8. Stock Assembly Pin.        | 13. Barrel Assembly.             |
| 4. Stock Assembly.     | 9. Trigger Housing Group.     | 14. Receiver Group.              |
| 5. Receiver Brush      | 10. Forestock Assembly.       |                                  |

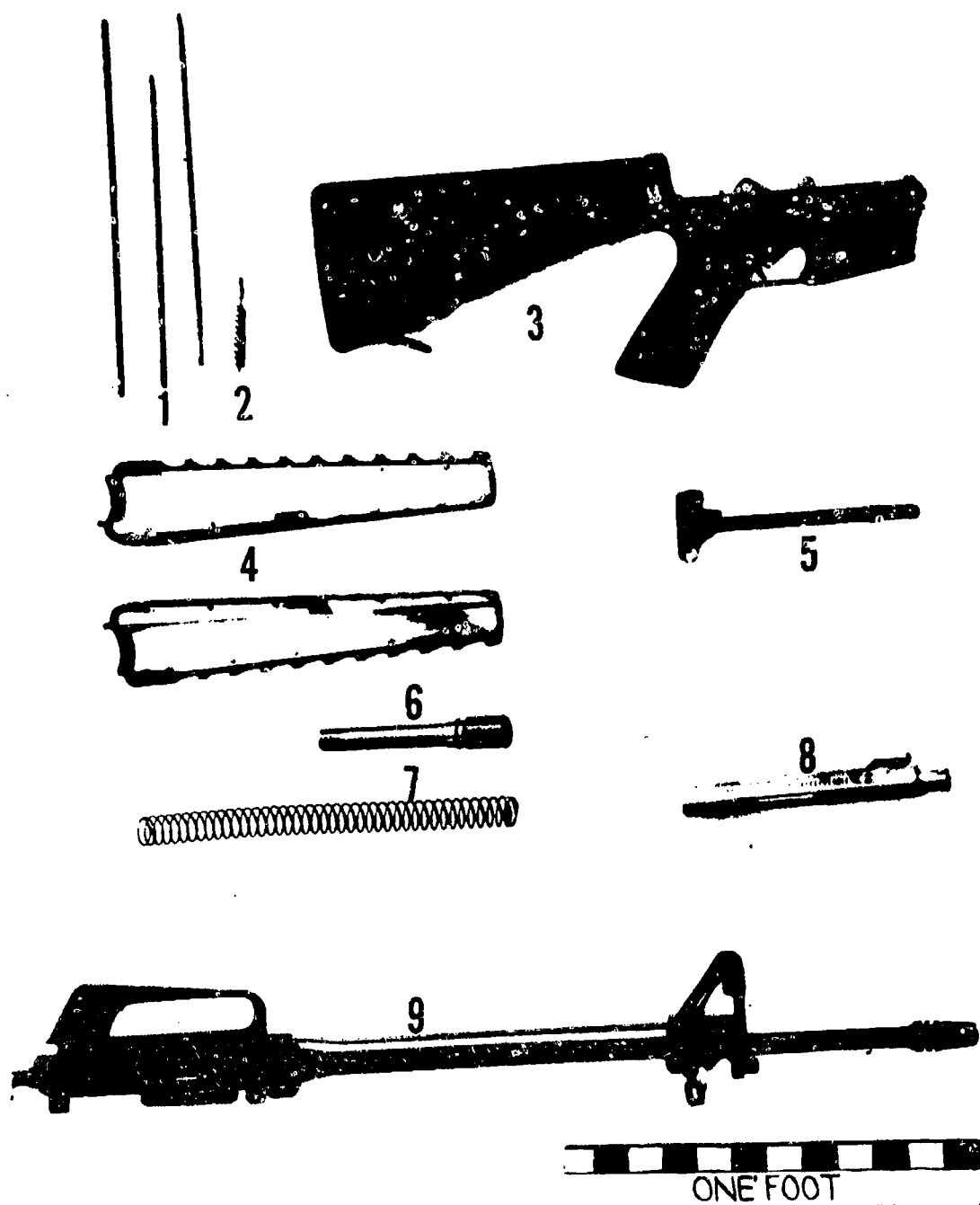


Figure 54

Rifle, 5.56-mm, XM16E1

- |                             |                               |
|-----------------------------|-------------------------------|
| 1. Cleaning Rod Sections.   | 6. Buffer Assembly.           |
| 2. Bore Brush.              | 7. Action Spring.             |
| 3. Lower Receiver Group.    | 8. Bolt Carrier Group.        |
| 4. Hand Guard (Left Half).  | 9. Upper Receiver Group (Less |
| 5. Hand Guard (Right Half). | Hand Guards).                 |

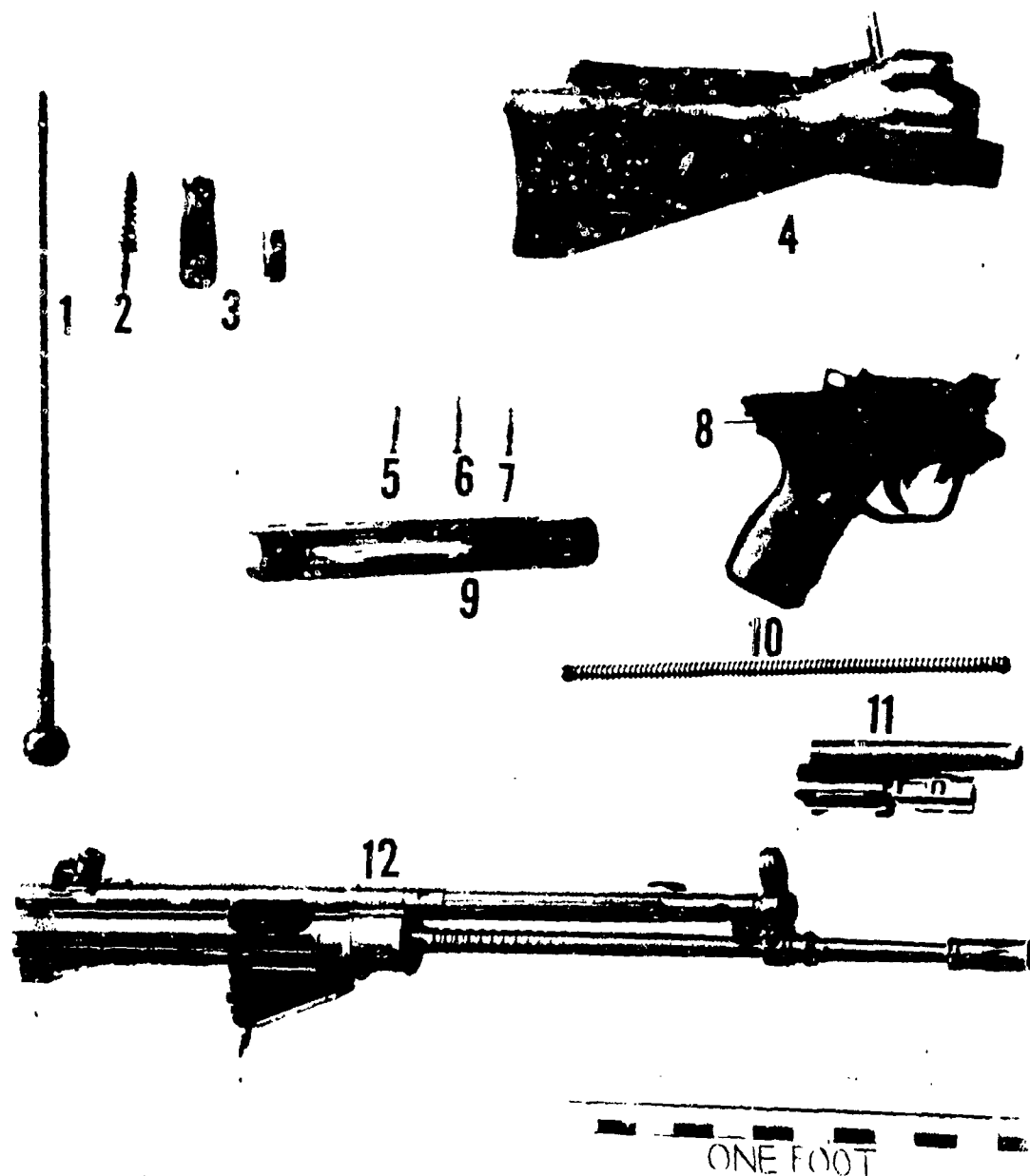


Figure 55

Rifle, 5.56-mm, H-R

- |                                 |                                   |
|---------------------------------|-----------------------------------|
| 1. Chamber Cleaning Rod.        | 7. Takedown Locking Pin, Small.   |
| 2. Chamber Brush.               | 8. Firing Mechanism.              |
| 3. Sight Adjustment Tool.       | 9. Hand Guard Assembly.           |
| 4. Butt Stock Assembly.         | 10. Recoil Spring Assembly.       |
| 5. Takedown Locking Pin, Small. | 11. Bolt Assembly.                |
| 6. Takedown Locking Pin, Large. | 12. Barrel and Receiver Assembly. |

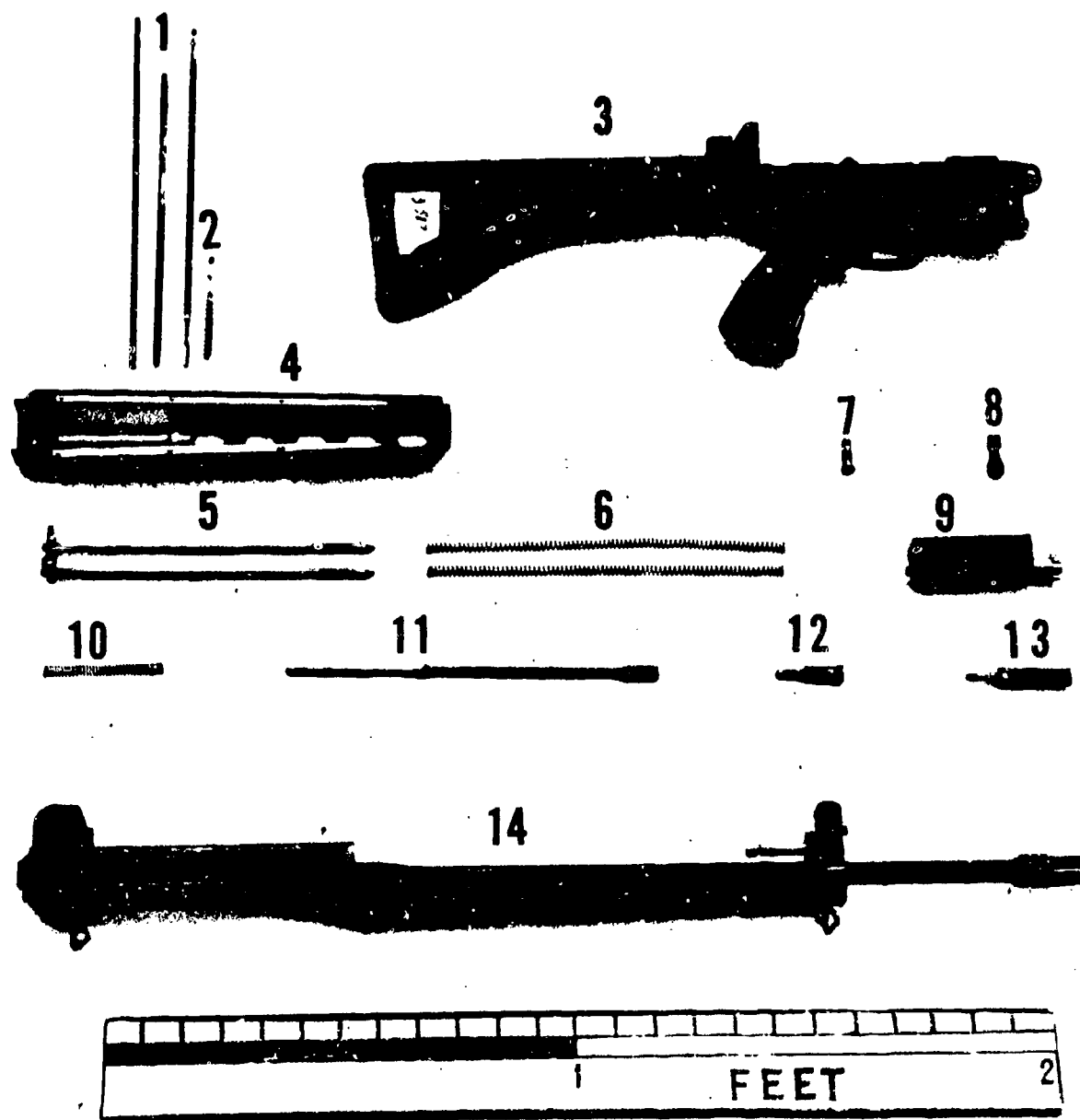


Figure 56

Rifle, 5.56-mm, A-R

- |                               |                                    |
|-------------------------------|------------------------------------|
| 1. Cleaning Rod Sections.     | 8. Charging Handle.                |
| 2. Bore Brush.                | 9. Bolt Carrier Assembly and Bolt. |
| 3. Lower Receiver Group.      | 10. Operating Rod Spring.          |
| 4. Upper Hand Guard Assembly. | 11. Operating Rod.                 |
| 5. Guide Rod Weld Assembly.   | 12. Operator Rod Link.             |
| 6. Action Springs.            | 13. Operating Rod Cylinder.        |
| 7. Cam Pin.                   | 14. Upper Receiver Group.          |

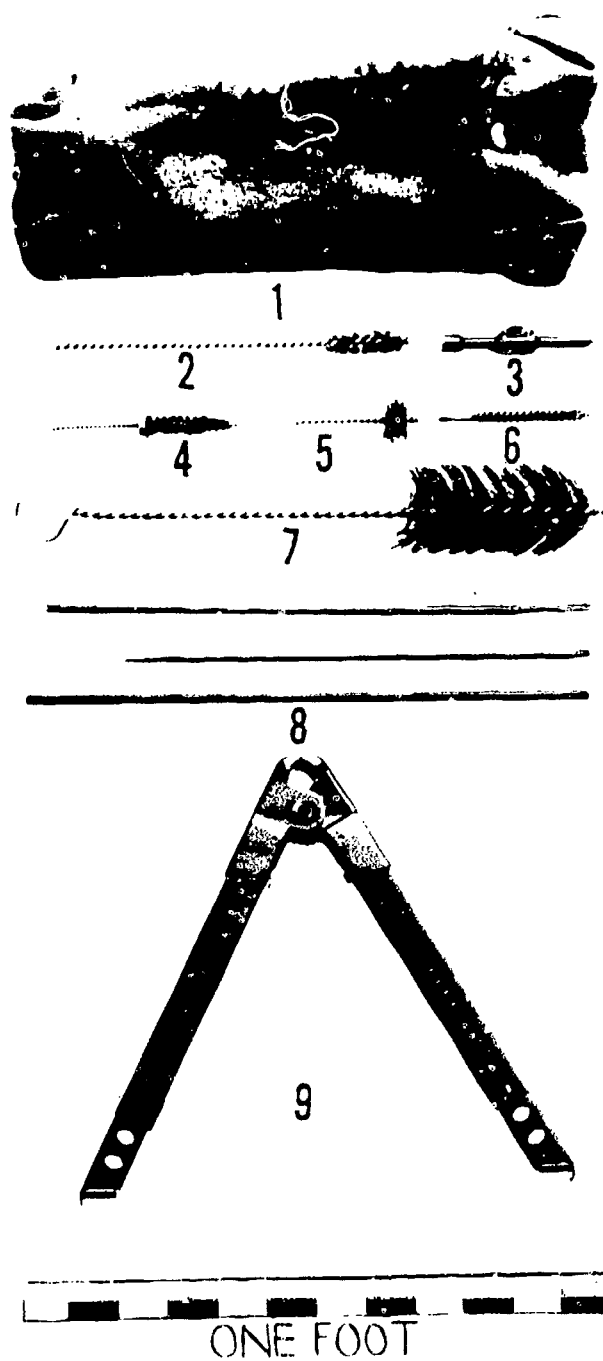


Figure 57

Maintenance Package for Rifle, 5.56-mm, S-R

- |                        |                           |
|------------------------|---------------------------|
| 1. Carrying Case.      | 6. Barrel Bore Brush.     |
| 2. Gas Cylinder Brush. | 7. Receiver Brush.        |
| 3. Combination Tool.   | 8. Cleaning Rod Sections. |
| 4. Chamber Brush.      | 9. Bipod.                 |
| 5. Locking Lug Brush.  |                           |

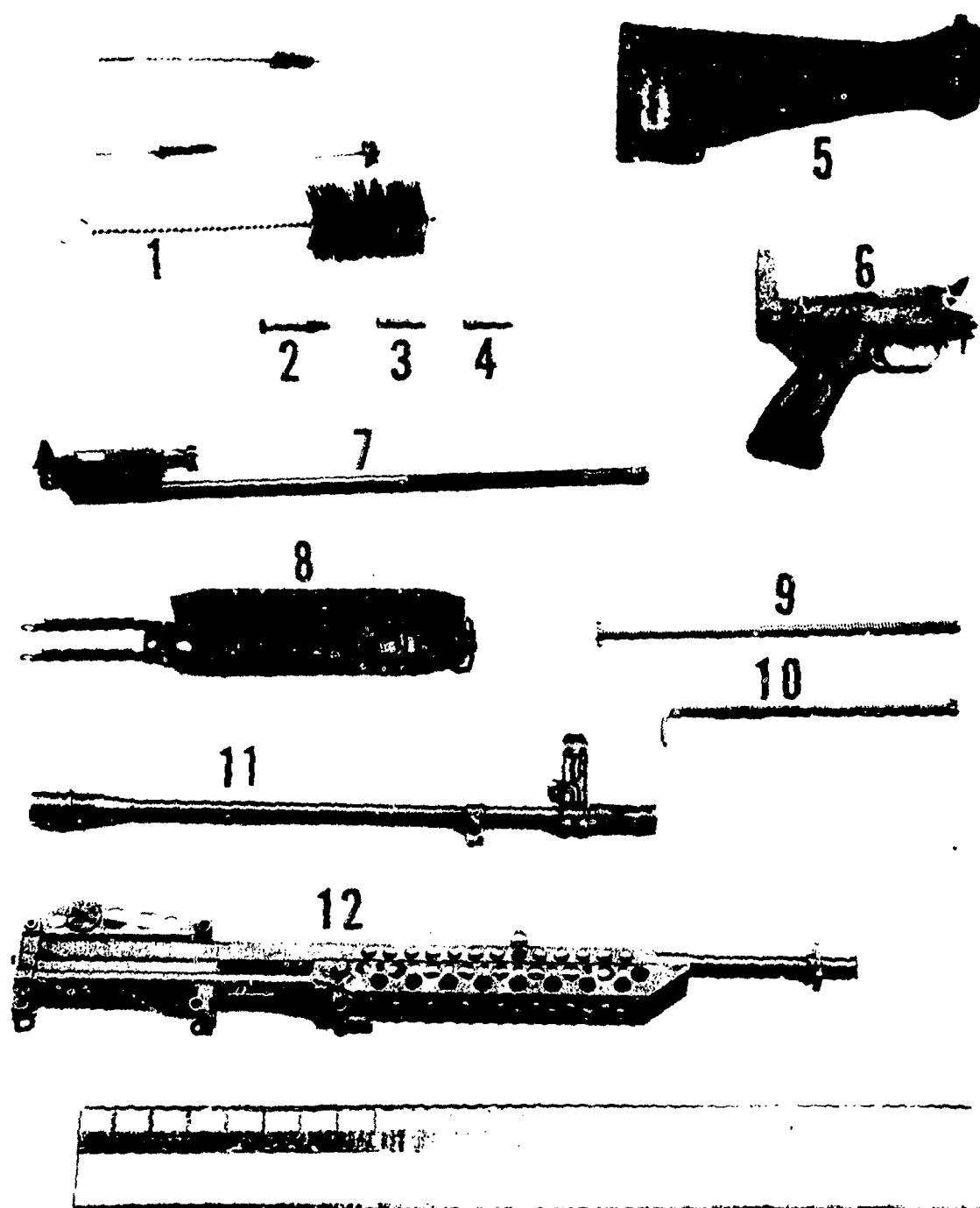


Figure 58

Carbine, 5.56-mm, S-C

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1. Brushes.                     | 7. Carrier and Piston Assembly. |
| 2. Pivot Pin Nut-Folding Stock. | 8. Forestock Assembly.          |
| 3. Forestock Assembly Pin.      | 9. Driving Spring.              |
| 4. Stock Assembly Pin.          | 10. Cocking Handle.             |
| 5. Stock Assembly.              | 11. Barrel Assembly.            |
| 6. Trigger Housing Group.       | 12. Receiver Group.             |

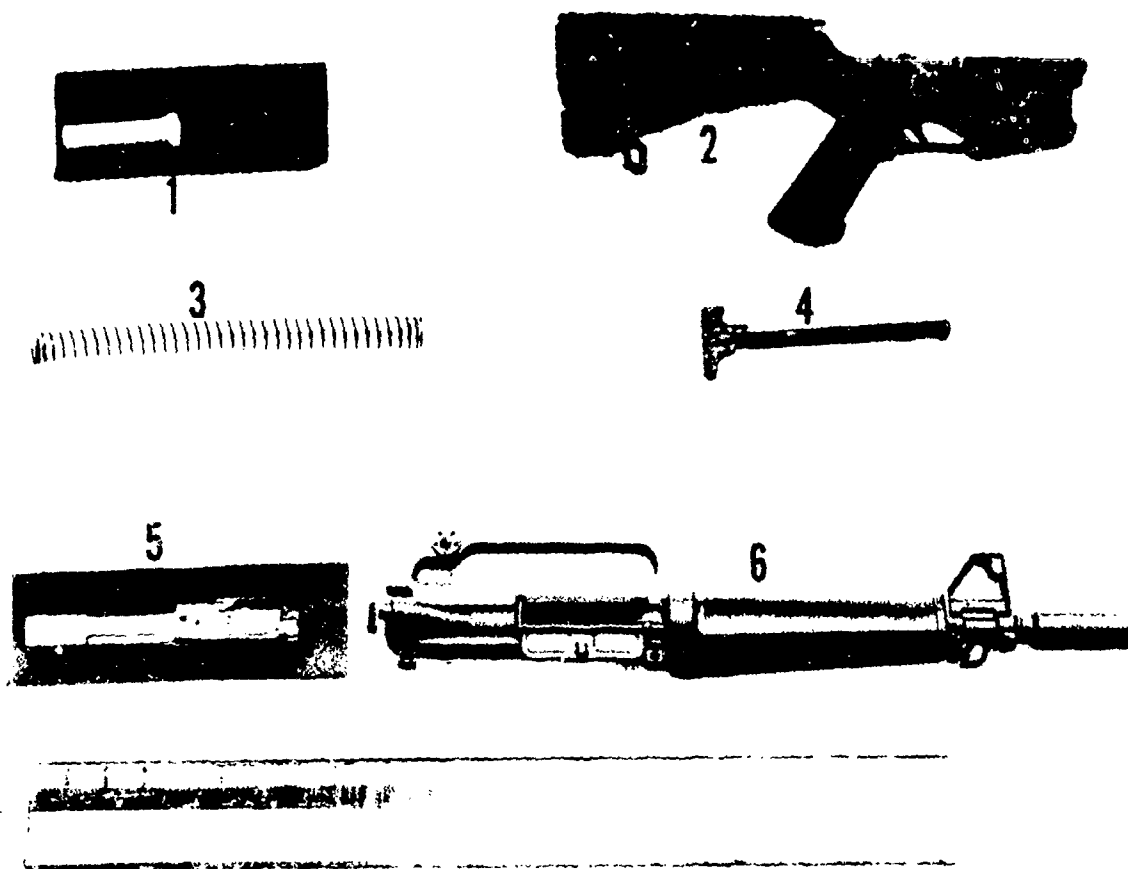


Figure 59

Carbine, 5.56-mm, C-SMG

- |                          |  |
|--------------------------|--|
| 1. Buffer Assembly.      | 4. Charging Handle.                    |
| 2. Lower Receiver Group. | 5. Bolt Carrier Group.                 |
| 3. Action Spring.        | 6. Upper Receiver and Barrel Assembly. |





Figure 60

Rifle, 7.62-mm, M14E2

- |                                |                                |
|--------------------------------|--------------------------------|
| 1. Stock Group.                | 7. Gas Cylinder Piston.        |
| 2. Firing Mechanism.           | 8. Gas Cylinder Plug.          |
| 3. Operating Rod Spring Guide. | 9. Breech Bolt.                |
| 4. Operating Rod.              | 10. Stabilizer Assembly.       |
| 5. Operating Rod Spring.       | 11. Barrel and Receiver Group. |
| 6. Connector Assembly.         |                                |

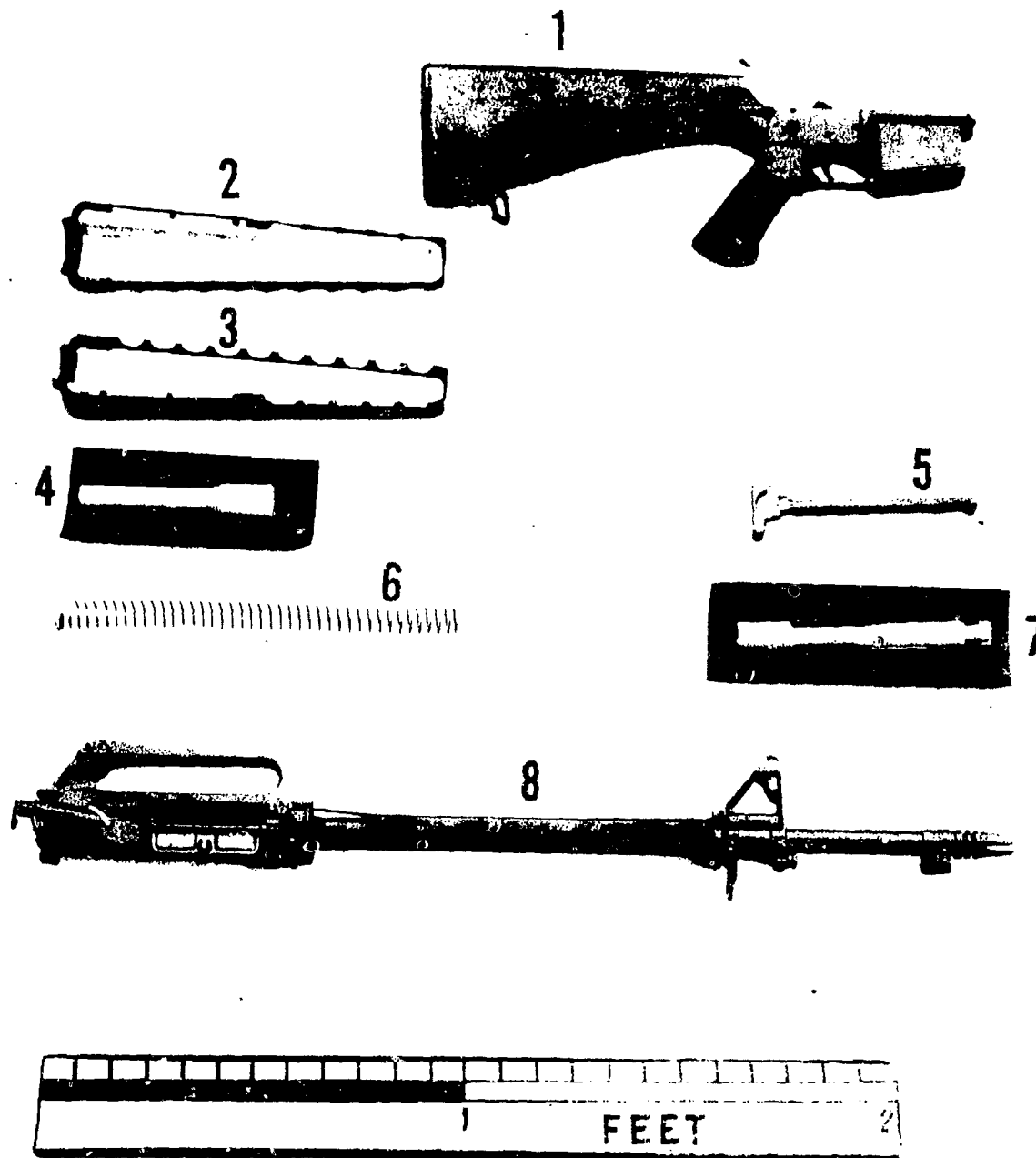


Figure 61

Rifle, 5.56-mm, C-AR

- |                             |   |
|-----------------------------|---|
| 1. Lower Receiver Group.    | 5. Charging Handle.                                       |
| 2. Hand Guard (Right Half). | 6. Action Spring.   |
| 3. Hand Guard (Left Half).  | 7. Bolt Carrier Group.                                    |
| 4. Buffer Assembly.         | 8. Upper Receiver and Barrel Assembly (Less Hand Guards). |

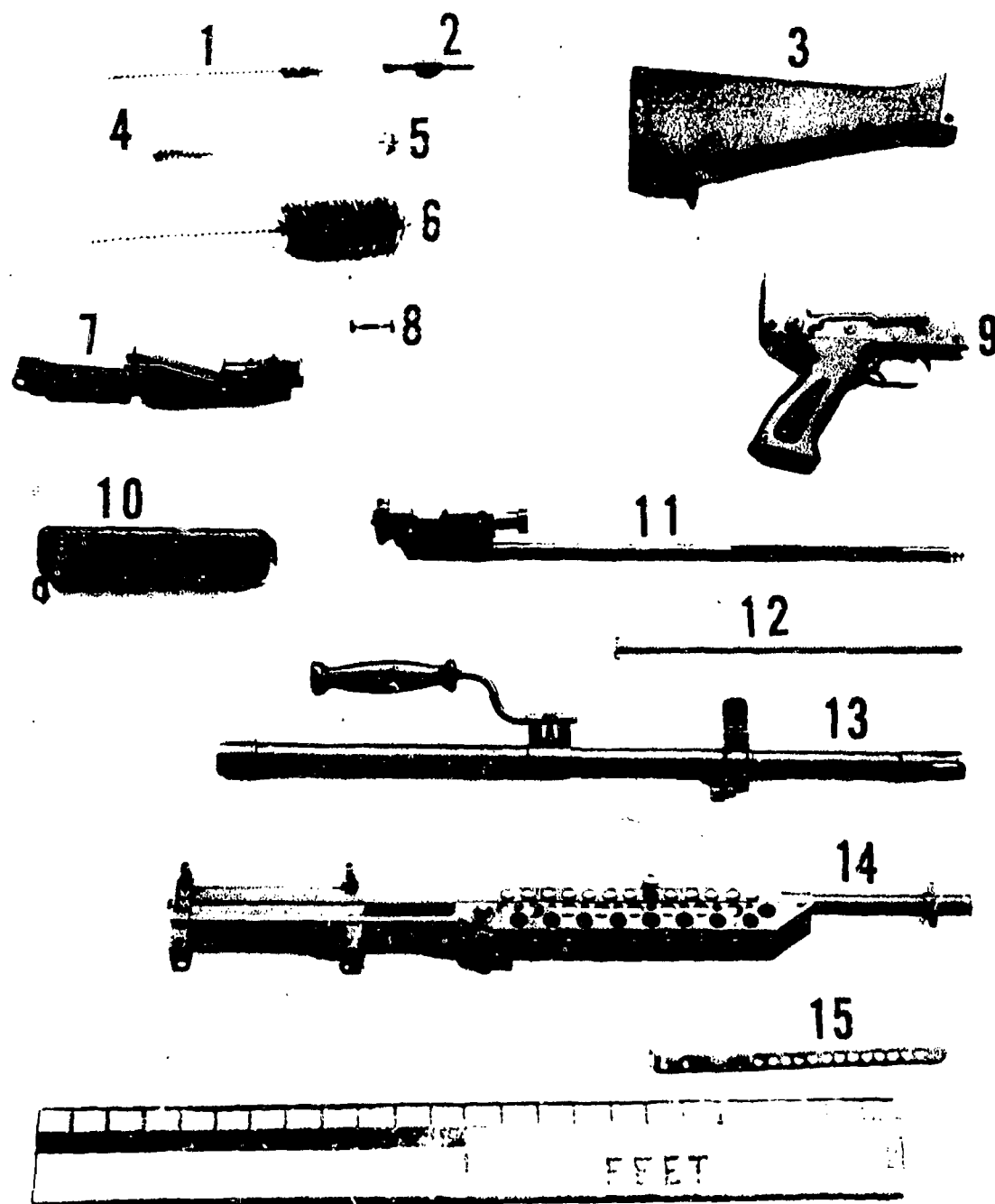


Figure 62

Rifle, 5.56-mm, S-AR

- |  |                                       |
|--|---------------------------------------|
| 1. Gas Cylinder Brush.                               | 8. Pivot Pin Nut and Pivot Pin Screw. |
| 2. Combination Tool.                                 | 9. Trigger Housing.                   |
| 3. Butt Stock Assembly.                              | 10. Forestock Assembly.               |
| 4. Chamber Brush.                                    | 11. Carrier and Piston Assembly.      |
| 5. Locking Lug Brush.                                | 12. Driving Spring.                   |
| 6. Receiver Brush.                                   | 13. Barrel Assembly.                  |
| 7. Housing and Sight Assembly with Magazine Adapter. | 14. Receiver Group.                   |
|  | 15. Cocking Handle.                   |

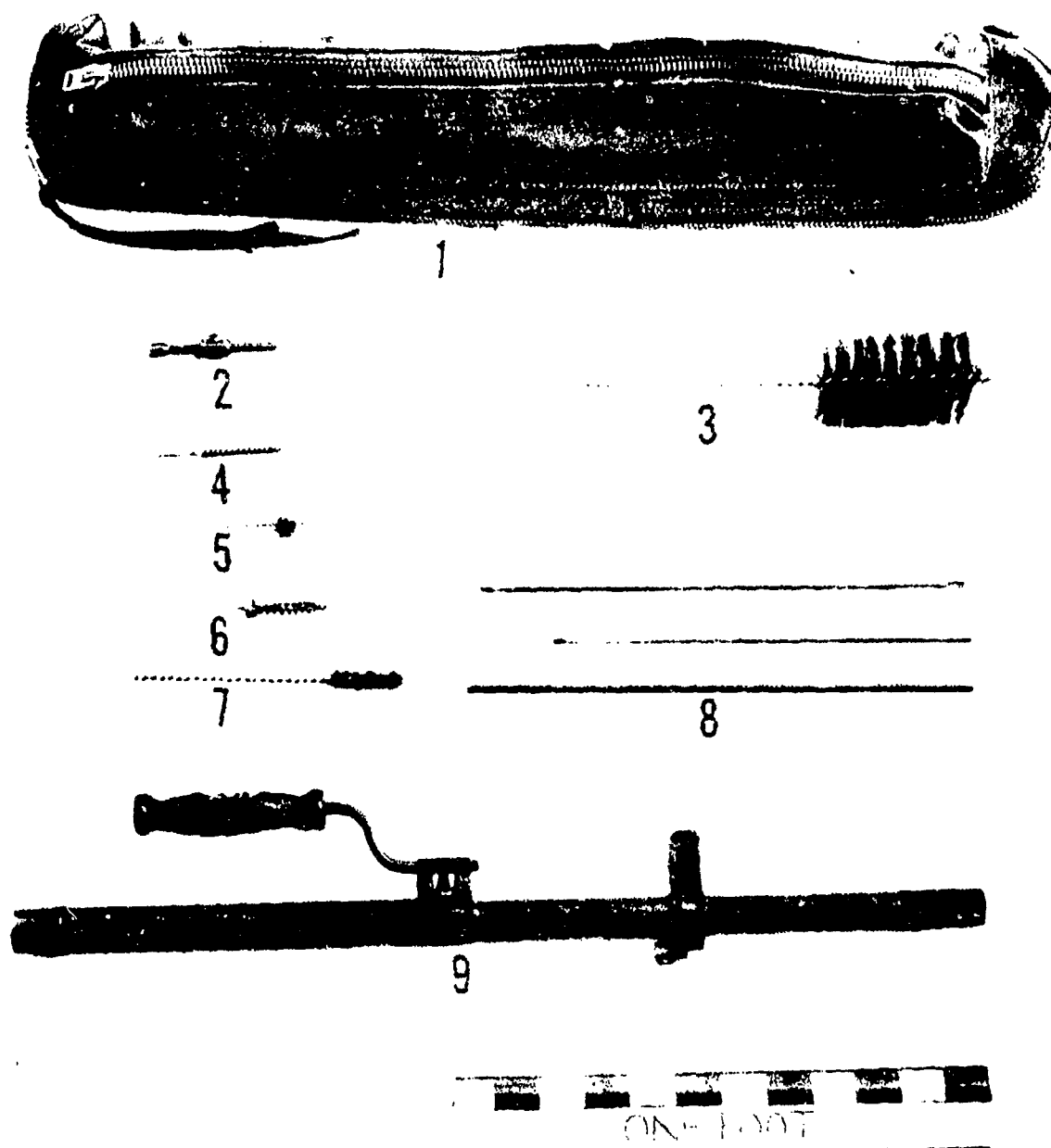


Figure 63

Maintenance Package for Rifle, 5.56-mm, S-AR and Machine Gun, 5.56-mm,  
Code S

- |                      |                          |
|----------------------|--------------------------|
| 1. Carrying Case     | 6. Chamber Brush         |
| 2. Combination Tool  | 7. Gas Cylinder Brush    |
| 3. Receiver Brush    | 8. Cleaning Rod Sections |
| 4. Barrel Bore Brush | 9. Spare Barrel          |
| 5. Locking Lug Brush |                          |

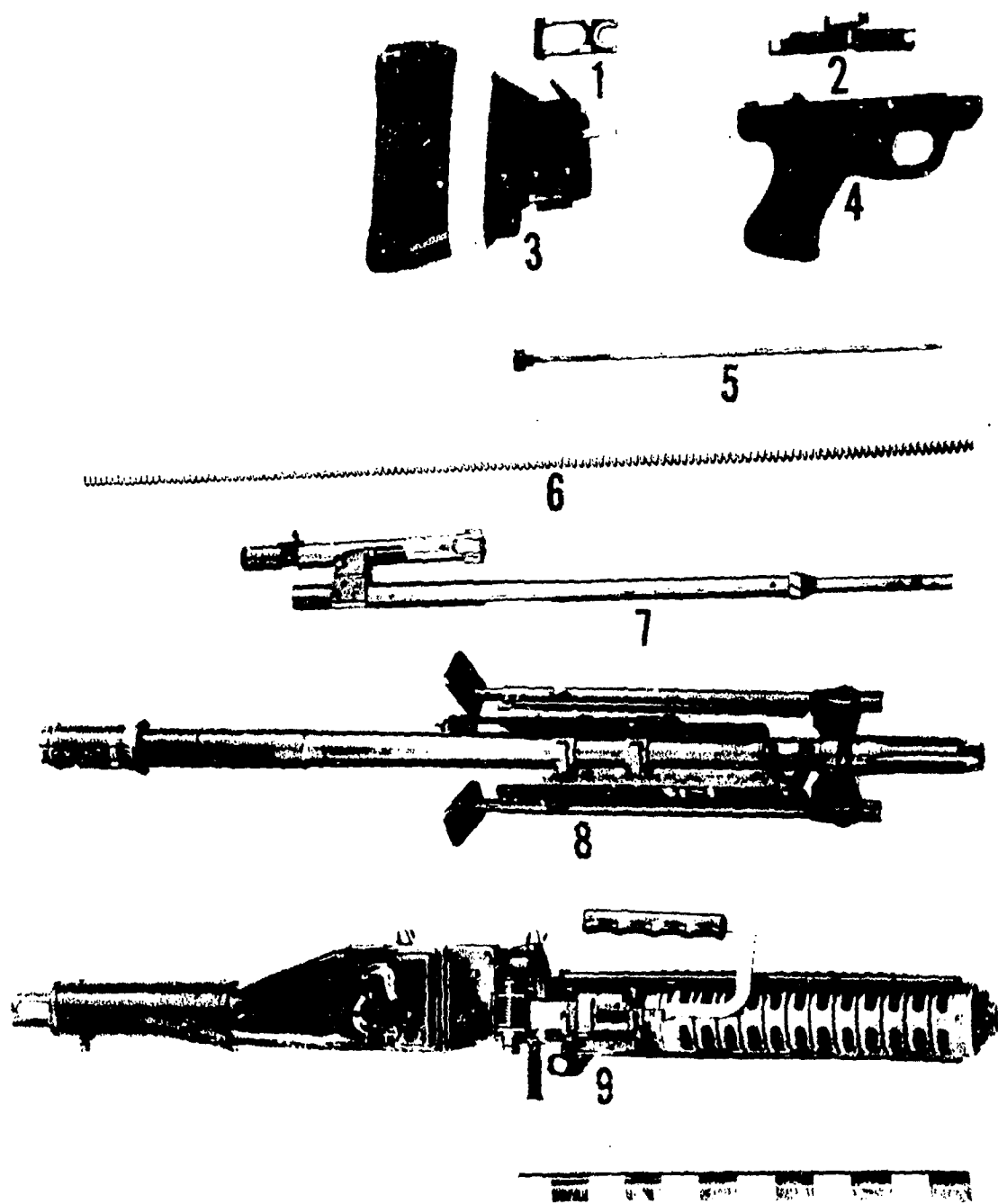


Figure 64 .

Machine Gun, 7.62-mm, M60

- |                                      |   |
|--------------------------------------|---|
| 1. Yoke.                             | 5. Guide.                                   |
| 2. Trigger Mechanism Spring and Pin. | 6. Operating Rod Spring.                    |
| 3. Stock Assembly                    | 7. Operating Rod Assembly and Bolt Assembly |
| 4. Trigger Mechanism Group           | 8. Barrel Assembly with Bipod Assembly      |
|                                      | 9. Receiver Group with Forearm Assembly     |

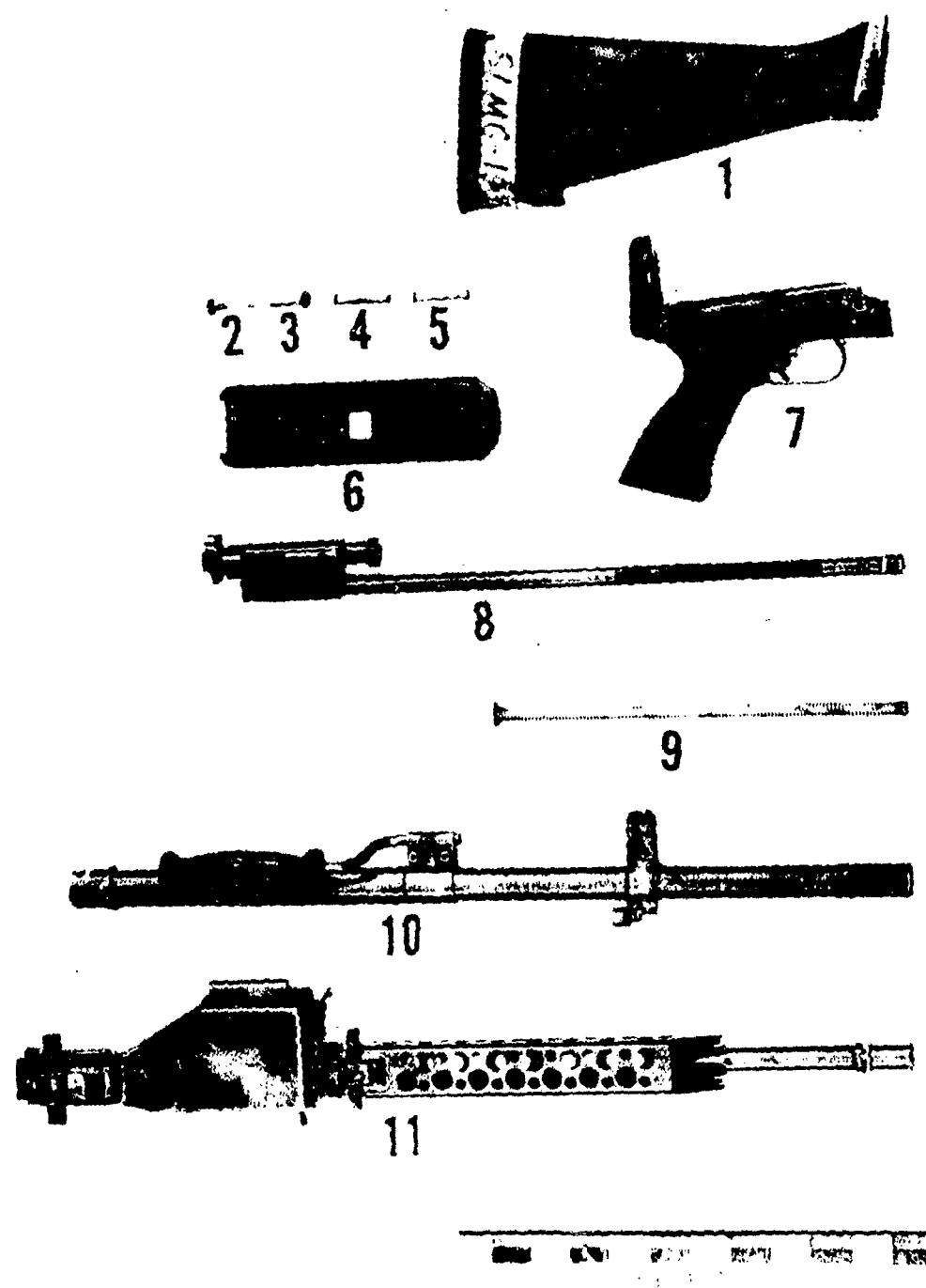


Figure 65

Machine Gun, 5.56-mm, Code S

- |                             |  |
|-----------------------------|--|
| 1. Stock Assembly.          | 7. Trigger Housing Group.                          |
| 2. Pivot Pin Screw.         | 8. Carrier and Piston Assembly with Bolt Assembly. |
| 3. Pivot Pin Nut.           | 9. Driving Spring.                                 |
| 4. Feed Cover Assembly Pin. | 10. Barrel Assembly.                               |
| 5. Stock Retaining Pin.     | 11. Receiver Assembly with Feed Cover Assembly.    |
| 6. Forestock Assembly.      |  |

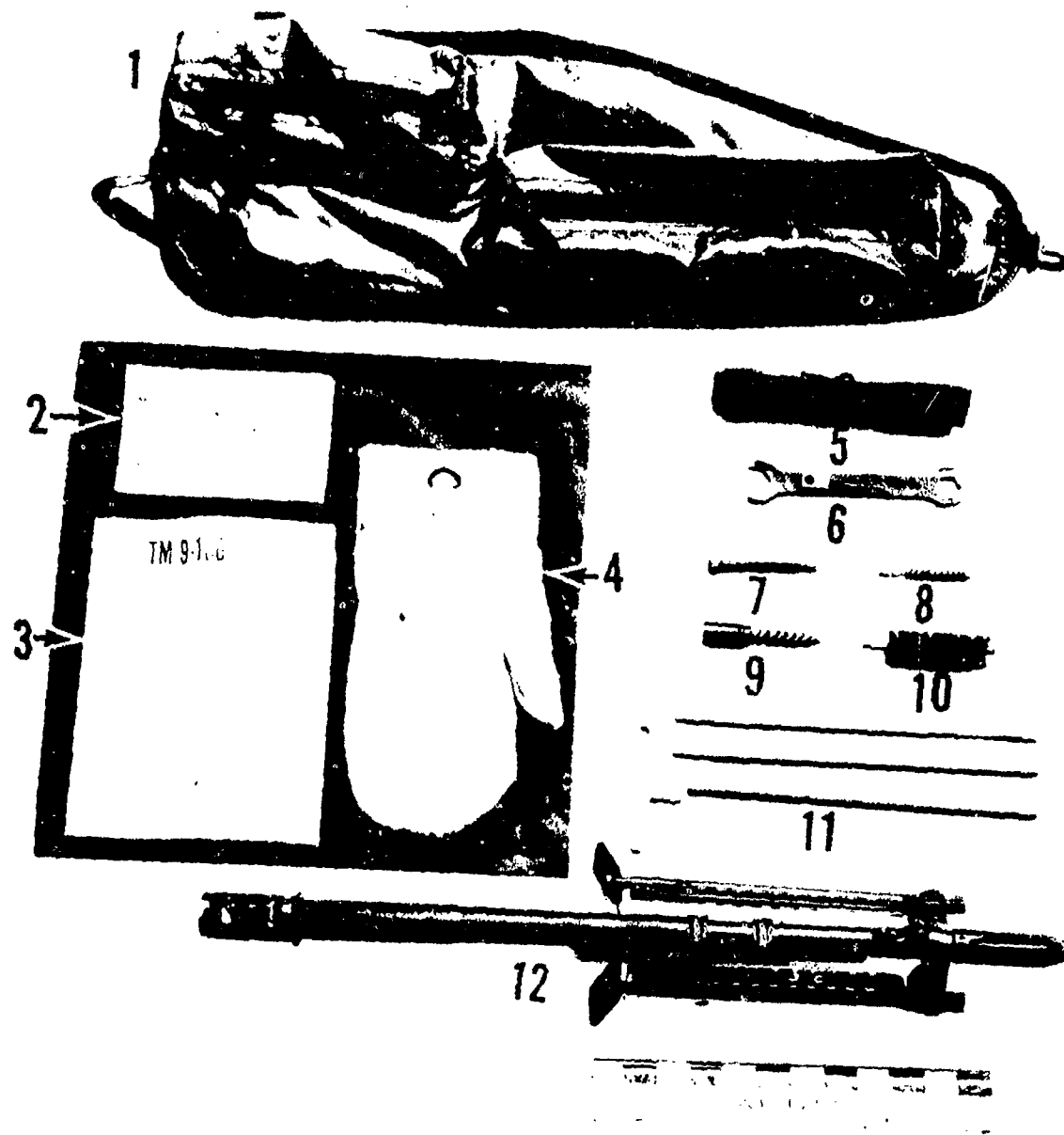


Figure 66

Maintenance Package for Machine Gun, 7.62-mm, M60

- |   |  |
|---|--|
| 1. Barrel Assembly and Equipment Carrying Case. | 7. Ruptured Cartridge Case. Extractor.         |
| 2. Maintenance Literature.                      | 8. Bore Brush.                                 |
| 3. Maintenance Literature.                      | 9. Chamber Brush.                              |
| 4. Asbestos Mitten.                             | 10. Receiver Brush.                            |
| 5. M1 Web Sling.                                | 11. Cleaning Rod Sections.                     |
| 6. Combination Screwdriver and Reamer Wrench.   | 12. Spare Barrel Assembly with Bipod Assembly. |

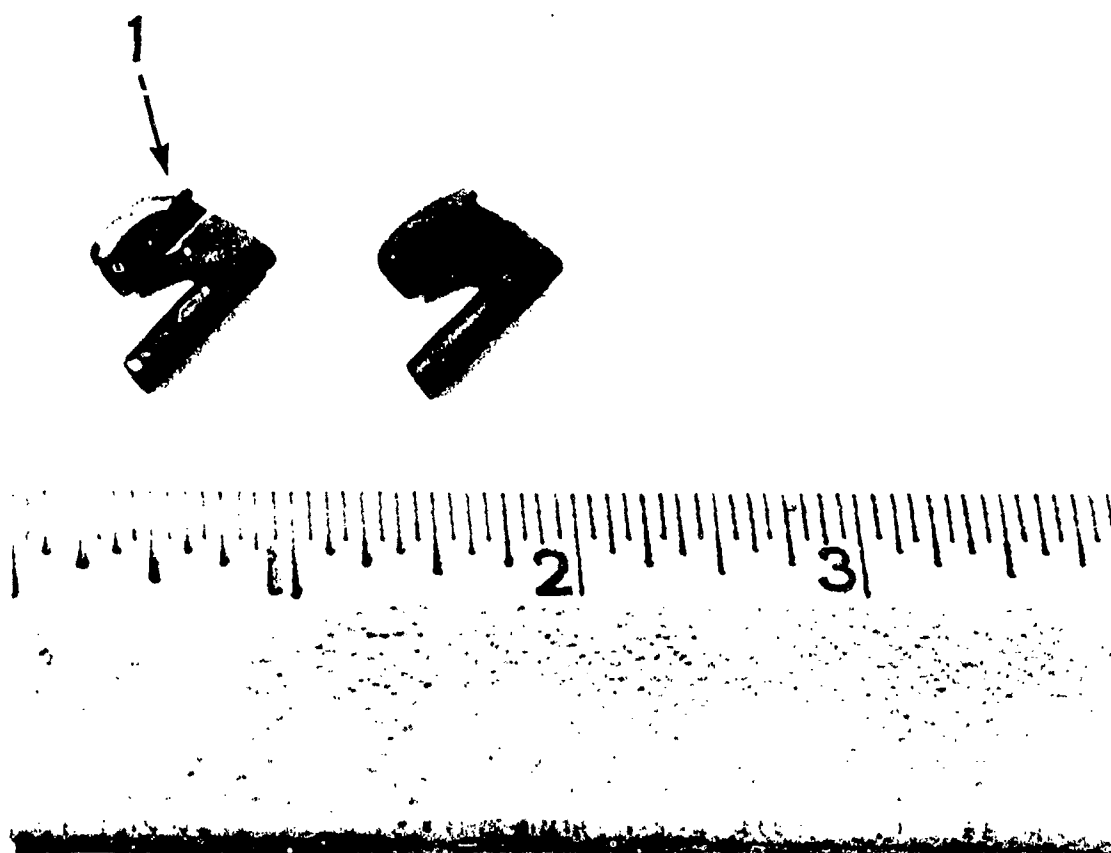


Figure 67

Chipped Extractor of Rifle, 7.62-mm, M14.



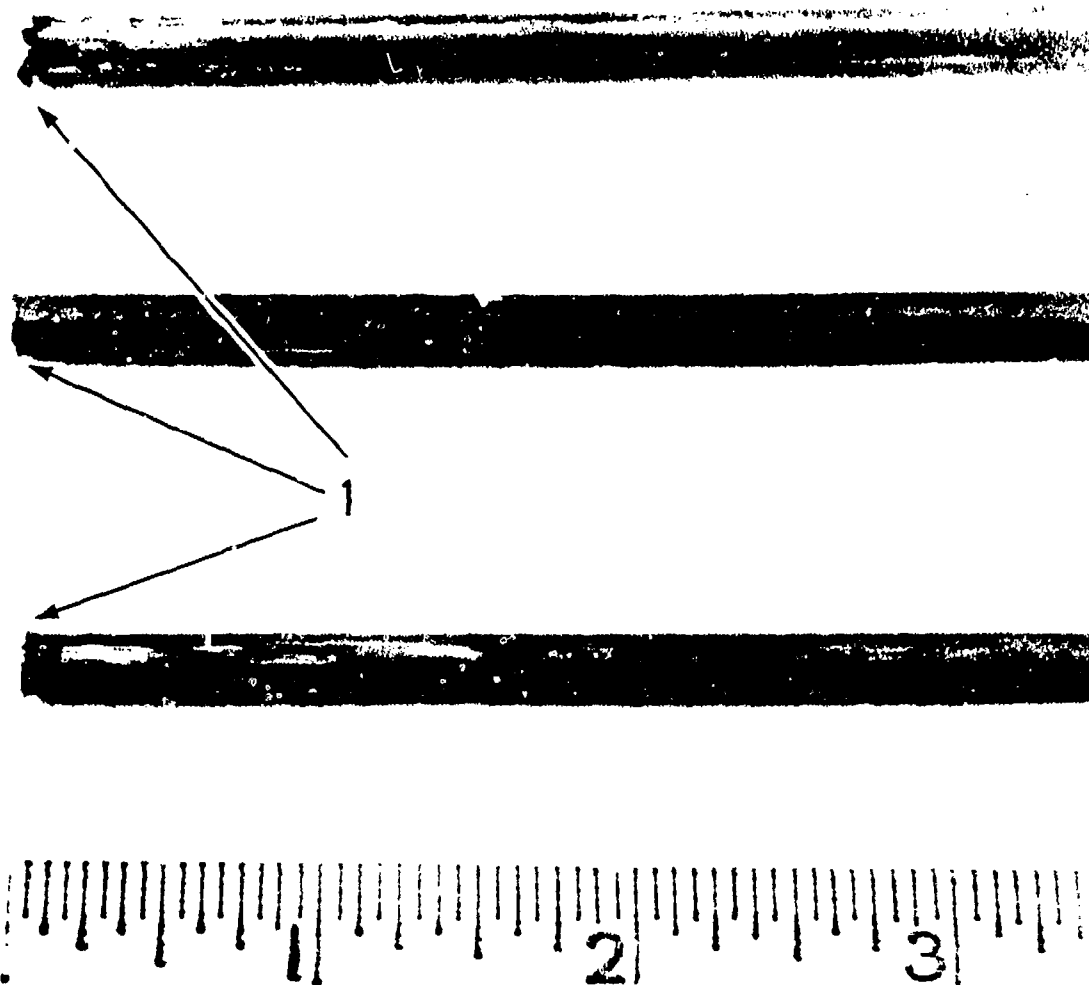
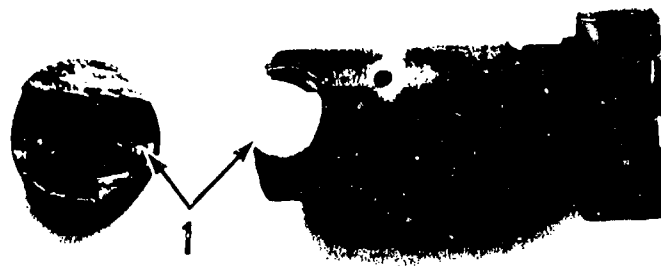


Figure 68

M11 Cleaning Rod

1. Flared Section Ends.



**INCHES**

Figure 69

Bolt of Rifle, 5.56-mm, S-R

1. Break Across Cam Pin Recess.

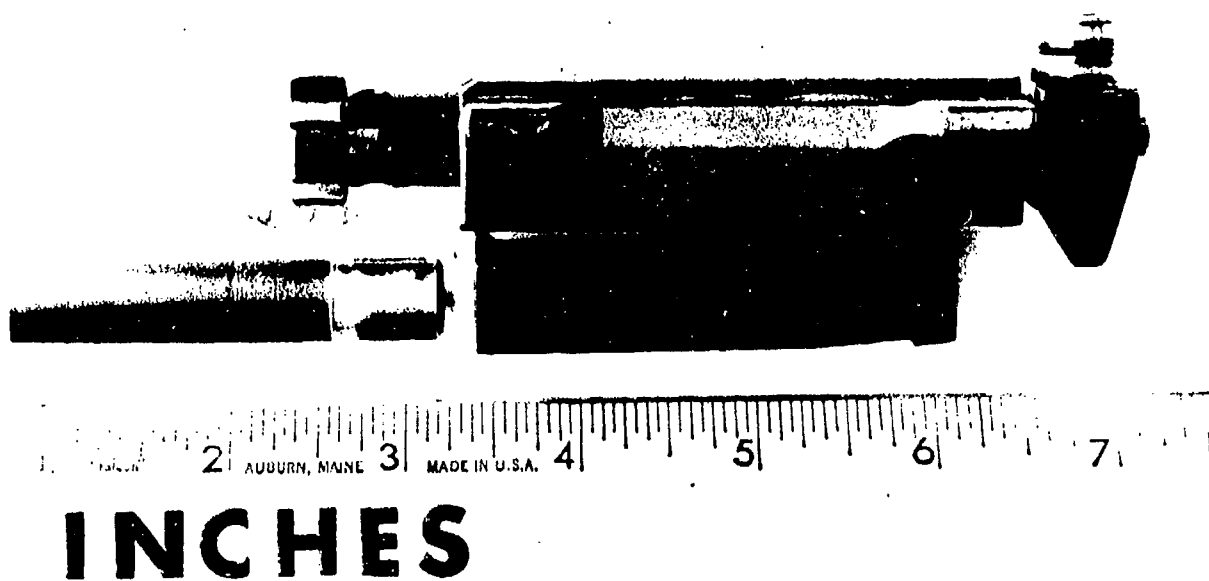


Figure 70

Rifle, 5.56-mm, S-R, showing  
separation of Bolt Carrier and Piston.

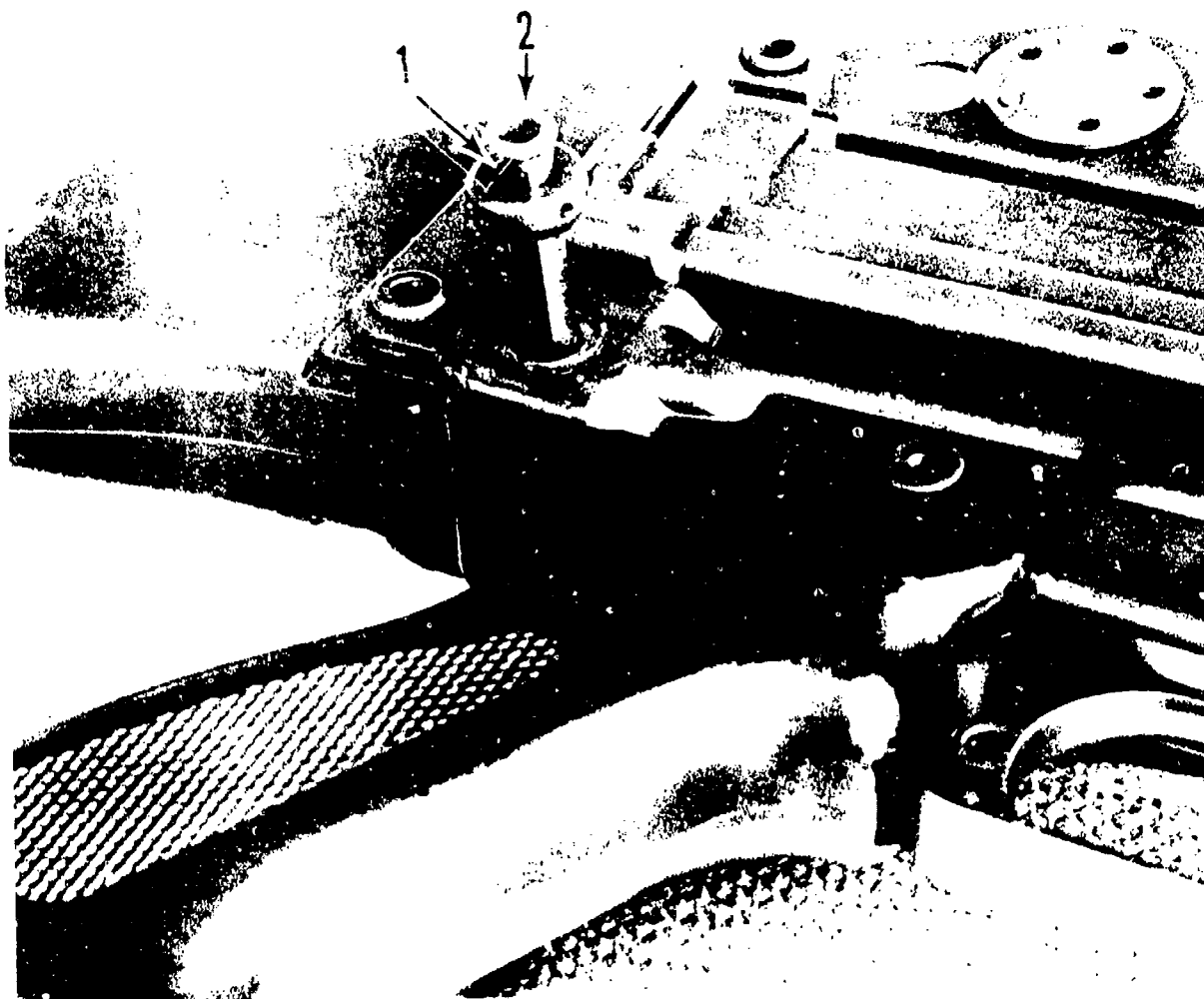


Figure 71

Rifle, 3.56-mm, S-K

1. Take-Down Pin Keeper separated from side of Trigger Housing.
2. Take-Down Pin with Take-Down Pin Keeper pulled free of Trigger Housing.

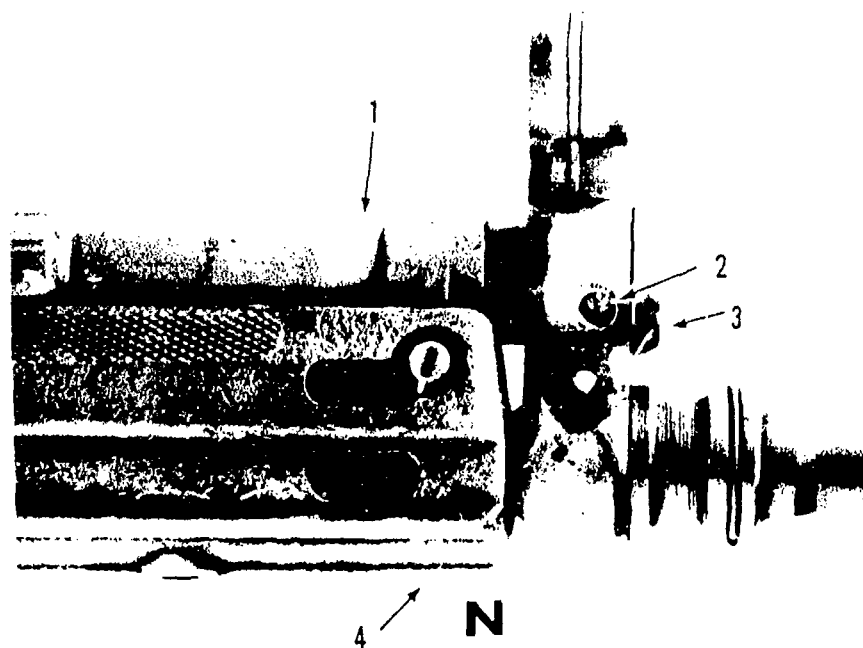
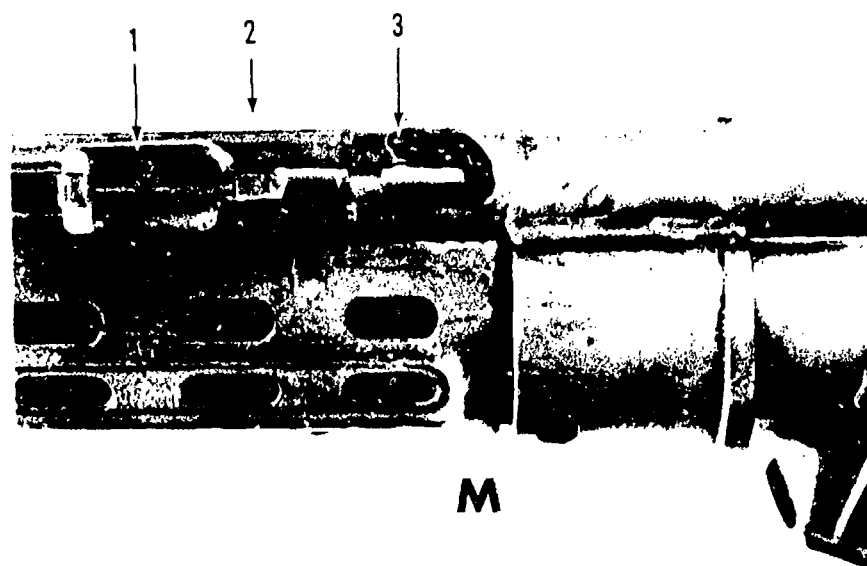


Figure 72

Rifle, 5.56-mm, M-16

M. Left Side View of Operating Rod Assembly.

1. Operating Rod Handle
2. Operating Rod Tube.
3. Operating Rod Pin loose.

N. Right Side View of Front Sight.

1. Operating Rod Tube.
2. Set Screw recess with Set Screw missing.
3. Bayonet Adapter.
4. Hand Guard.

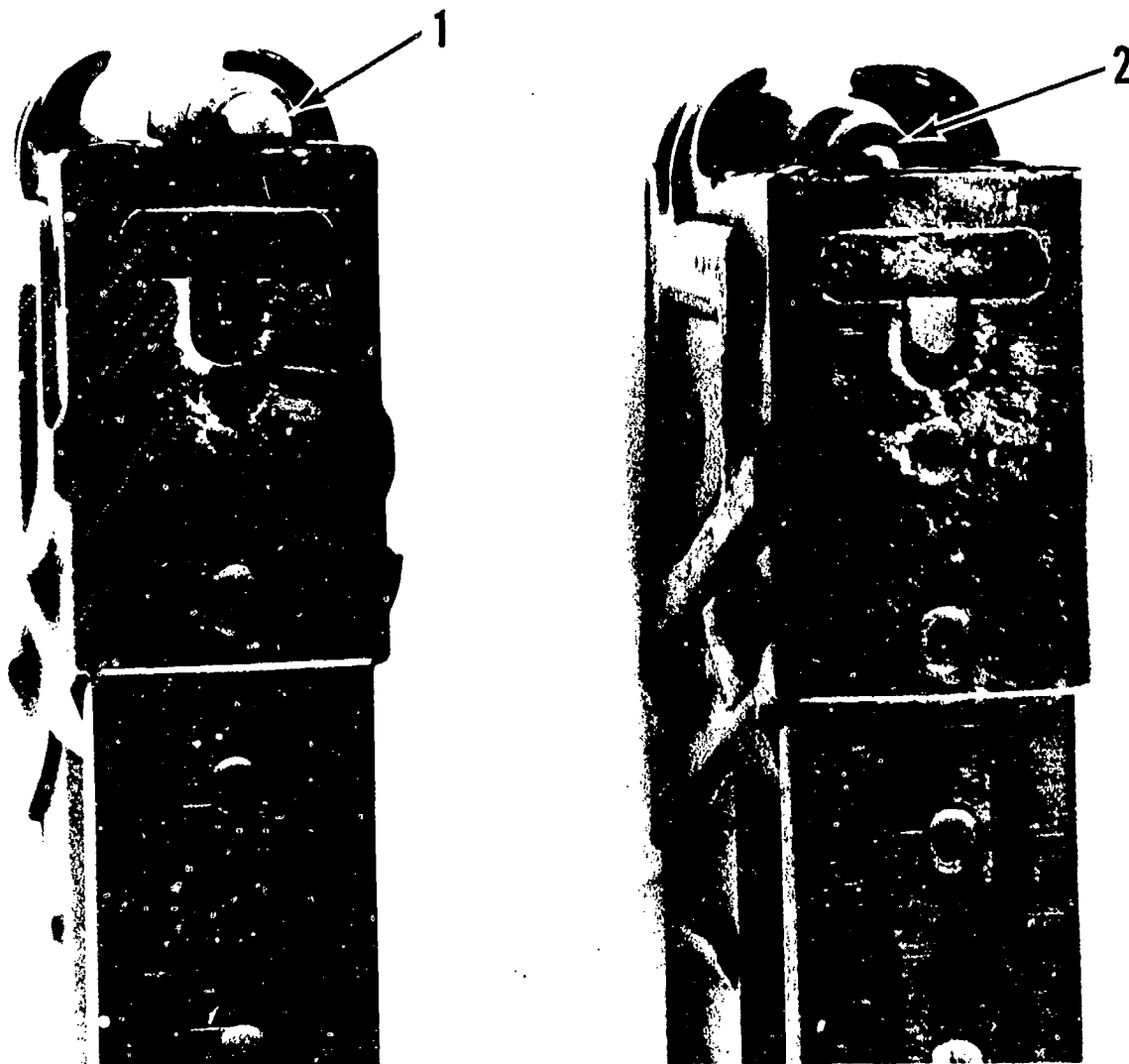
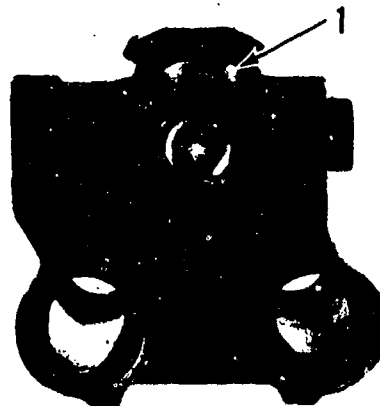


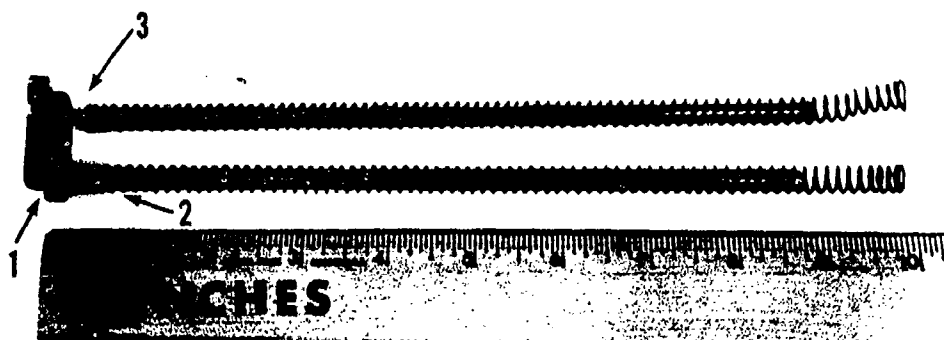
Figure 73

Magazines of Rifle, 5.56-mm, H-R, showing:

1. Properly oriented Cartridge, Ball, 5.56-mm, M193.
2. Cartridge, Ball, 5.56-mm, M193, damaged by malfunction.



**M**



**N**

Figure 74

Rifle, 5.56-mm, A-R

- M. Bolt Carrier Assembly.
  - 1. Burring preventing removal of Firing Pin.
- N. Broken Guide Rod Weld Assembly.
  - 1. Guide Rod Plate Casting.
  - 2. Guide Rod and Action Spring.
  - 3. Guide Rod separated from Guide Rod Plate Casting.

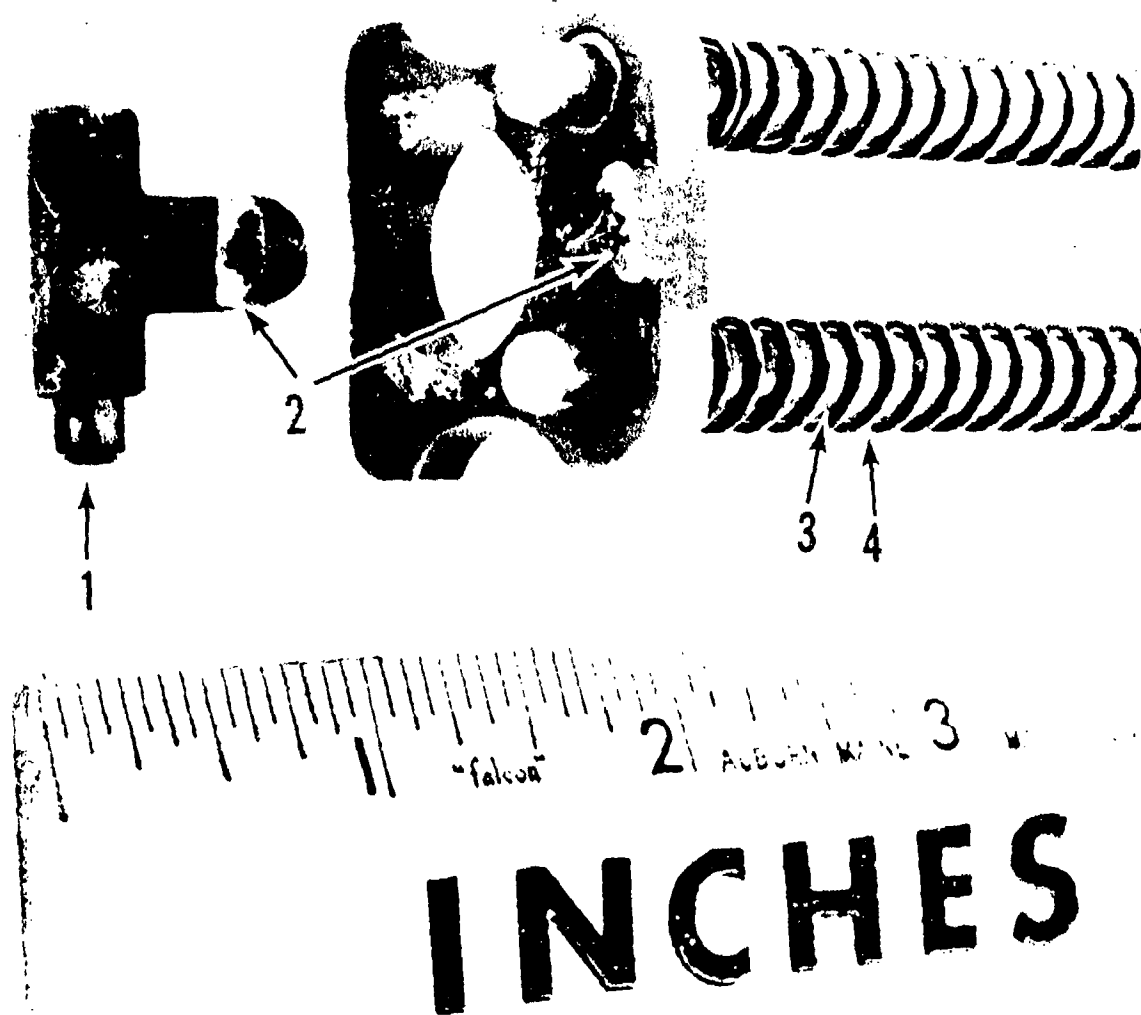


Figure 75

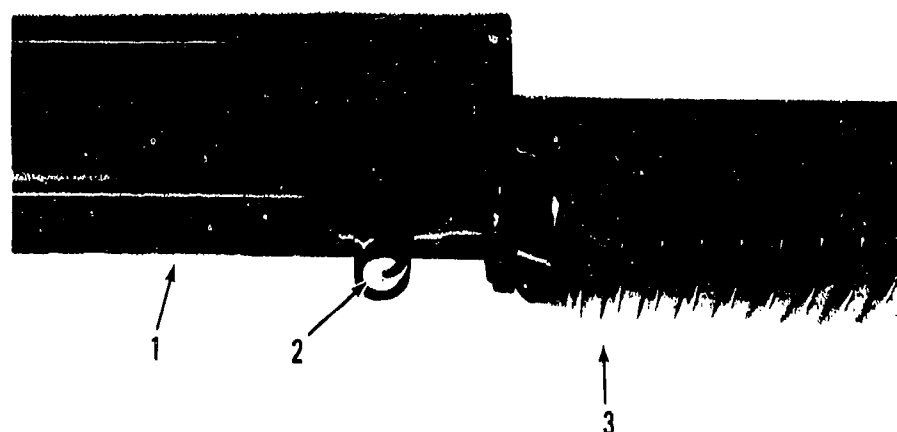
Rifle, 5.56-mm, A-R

1. Guide Rod Plate Takedown Plunger sheared from Guide Rod Plate Casting.
2. Shear.
3. Guide Rod.
4. Action Spring.





**M**



**N**

Figure 76

Rifle, 5.56-mm, A-R

- M. Bottom View of Upper Receiver Group.
  - 1. Crack in Barrel Extension.
- N. Right Side View of Upper Receiver Group.
  - 1. Receiver.
  - 2. Broken Upper Receiver Pivot.
  - 3. Upper Hand Guard.

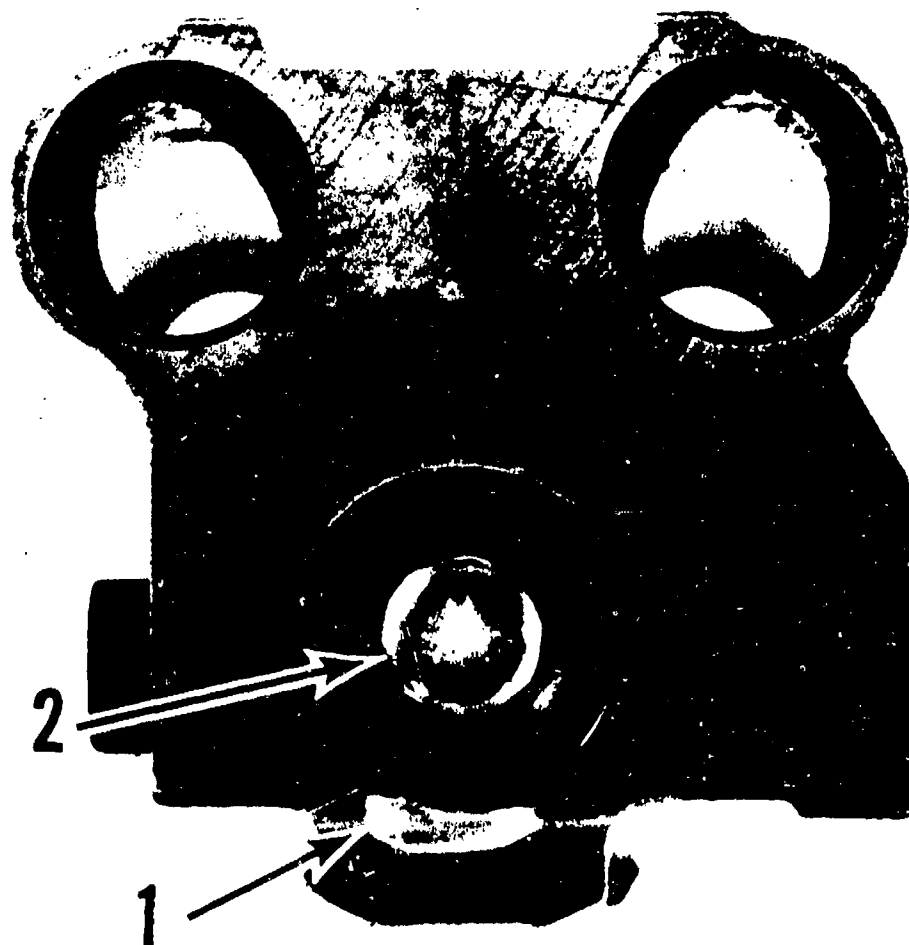


Figure 77

Bolt Carrier Assembly of Rifle, 5.56-mm, A-R

1. Burring preventing removal of Firing Pin.
2. Firing Pin

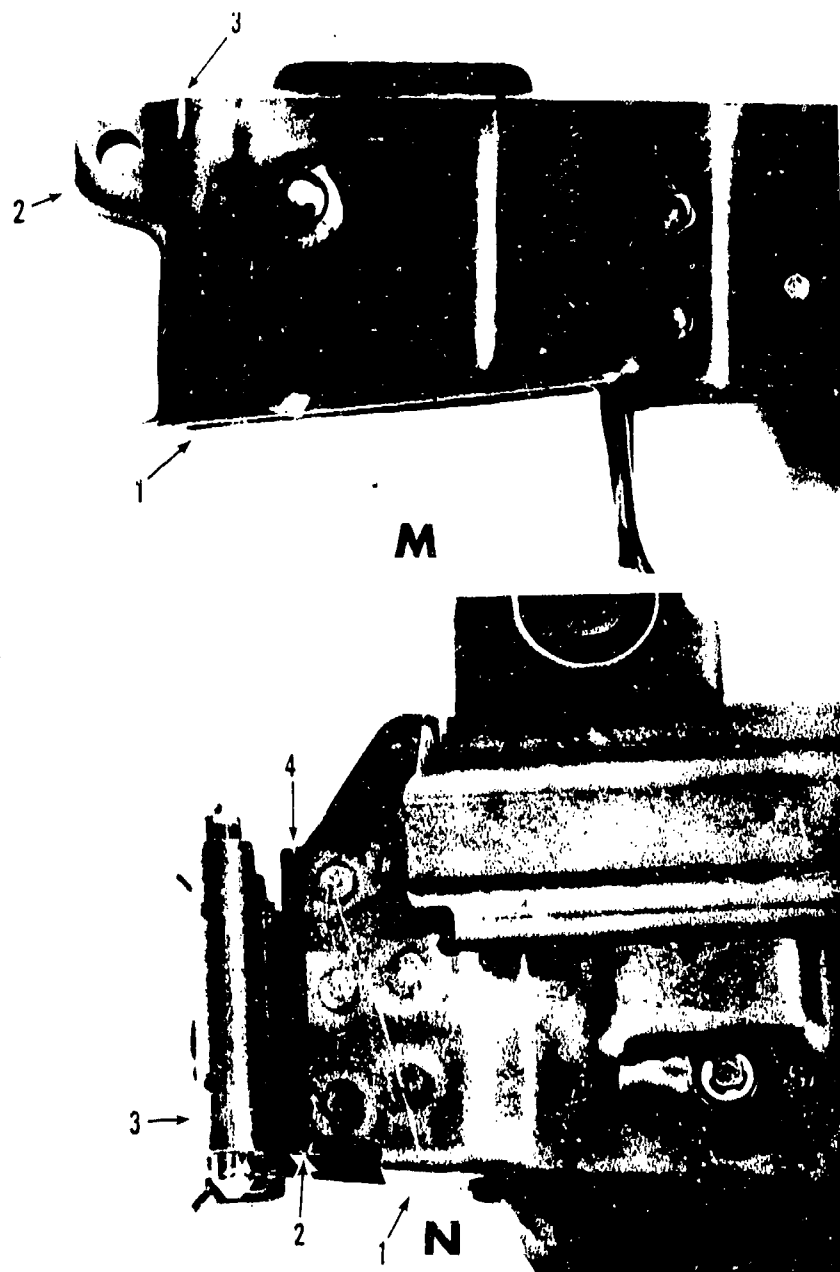


Figure 78

Rifle, 5.56-mm, A-R

- M. Left Side View of Lower Receiver Group.
  - 1. Magazine Well.
  - 2. Lower Receiver Pivots.
  - 3. Crack in Magazine Housing.
- N. Right Side View of Lower Receiver Weld and Rivet Assembly with Pistol Grip.
  - 1. Bottom Rear of Lower Receiver Weld and Rivet Assembly.
  - 2 and 4. Weld separation of Rear Plate from Lower Receiver Weld and Rivet Assembly.
  - 3. Bulkhead Weld Assembly.

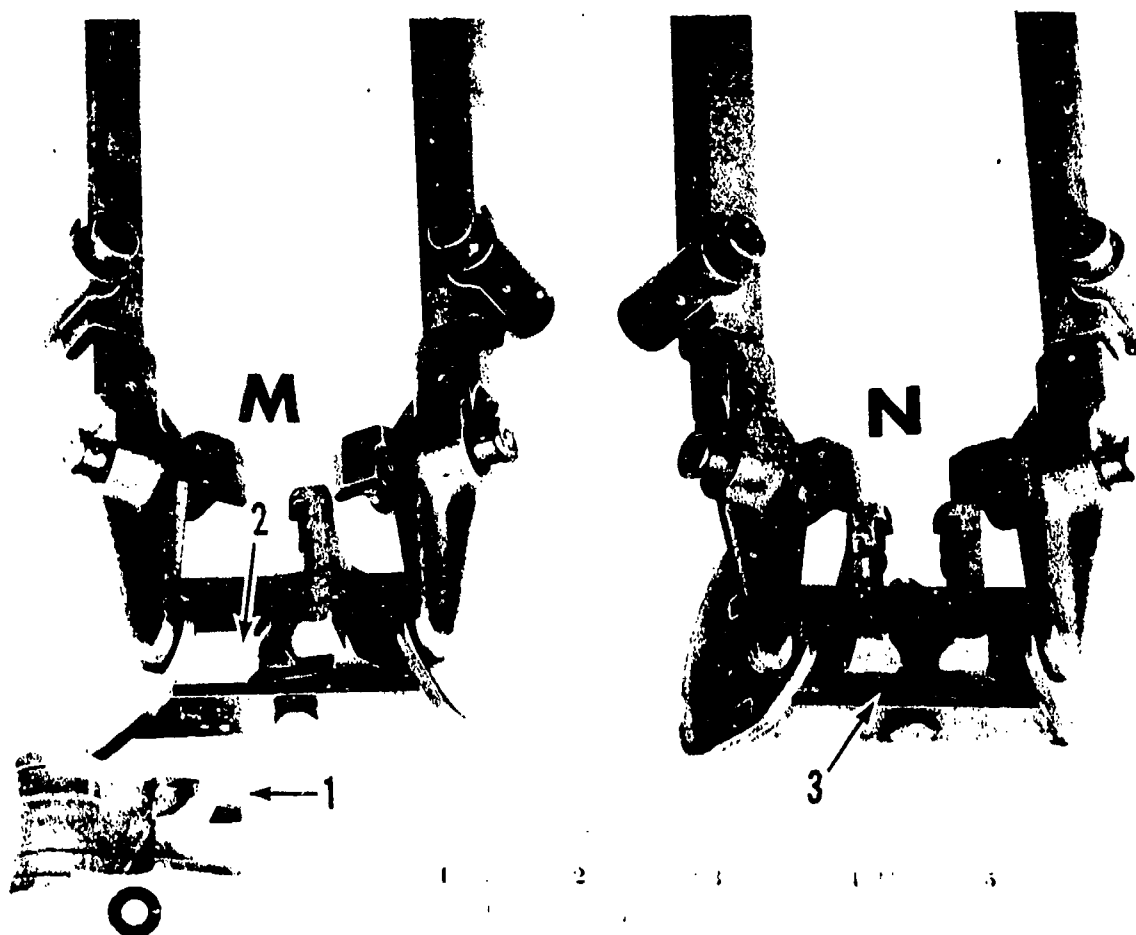
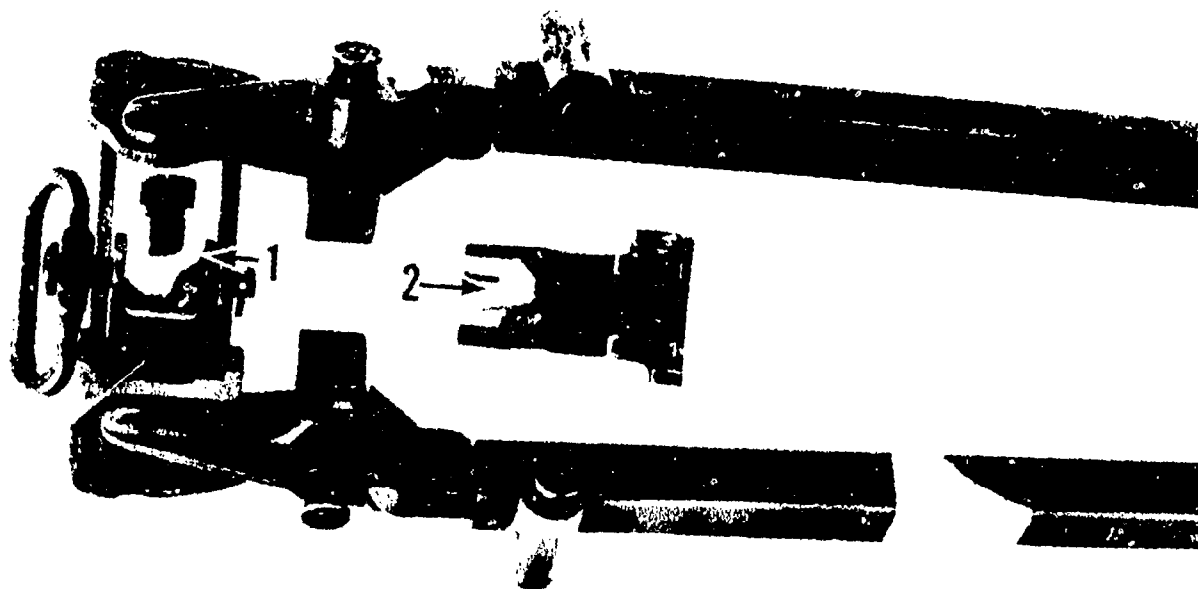


Figure 79

Rifle, Bipod, M2

- M. Bipod with broken Jaw.
- N. Bipod with broken Jaw replaced.
- O. Broken Jaw.
  - 1. Broken Jaw with chip showing break.
  - 2&3. Break.



**INCHES**

Figure 80

Rifle Bipod, M2 (Modified)

1. and 2.. Pieces of Broken Jaw.

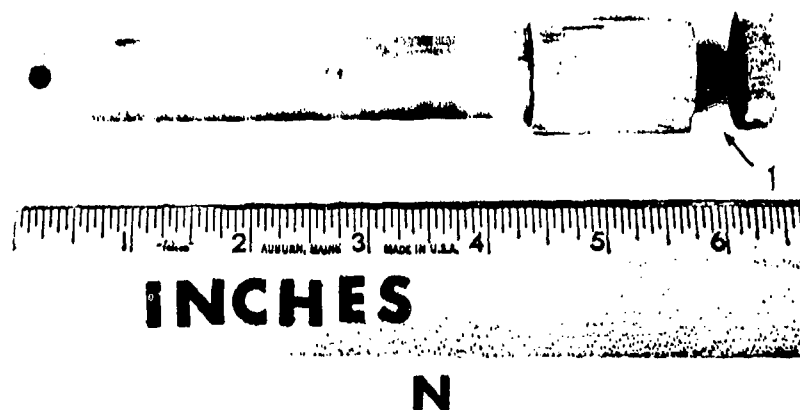
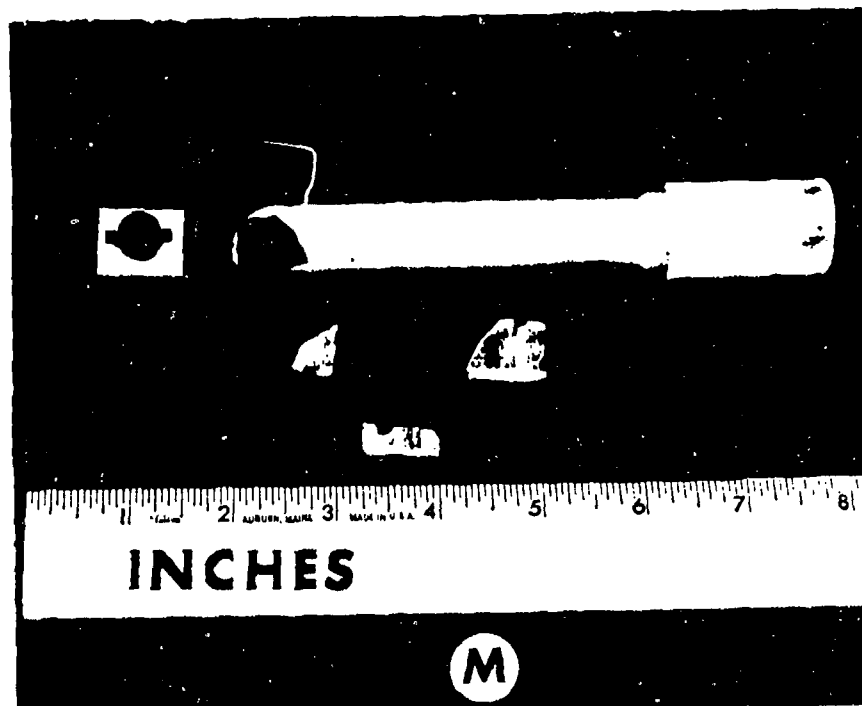


Figure 81  
Action Spring Guide Assembly

M - Multiple Break.  
N - Clean Shear.

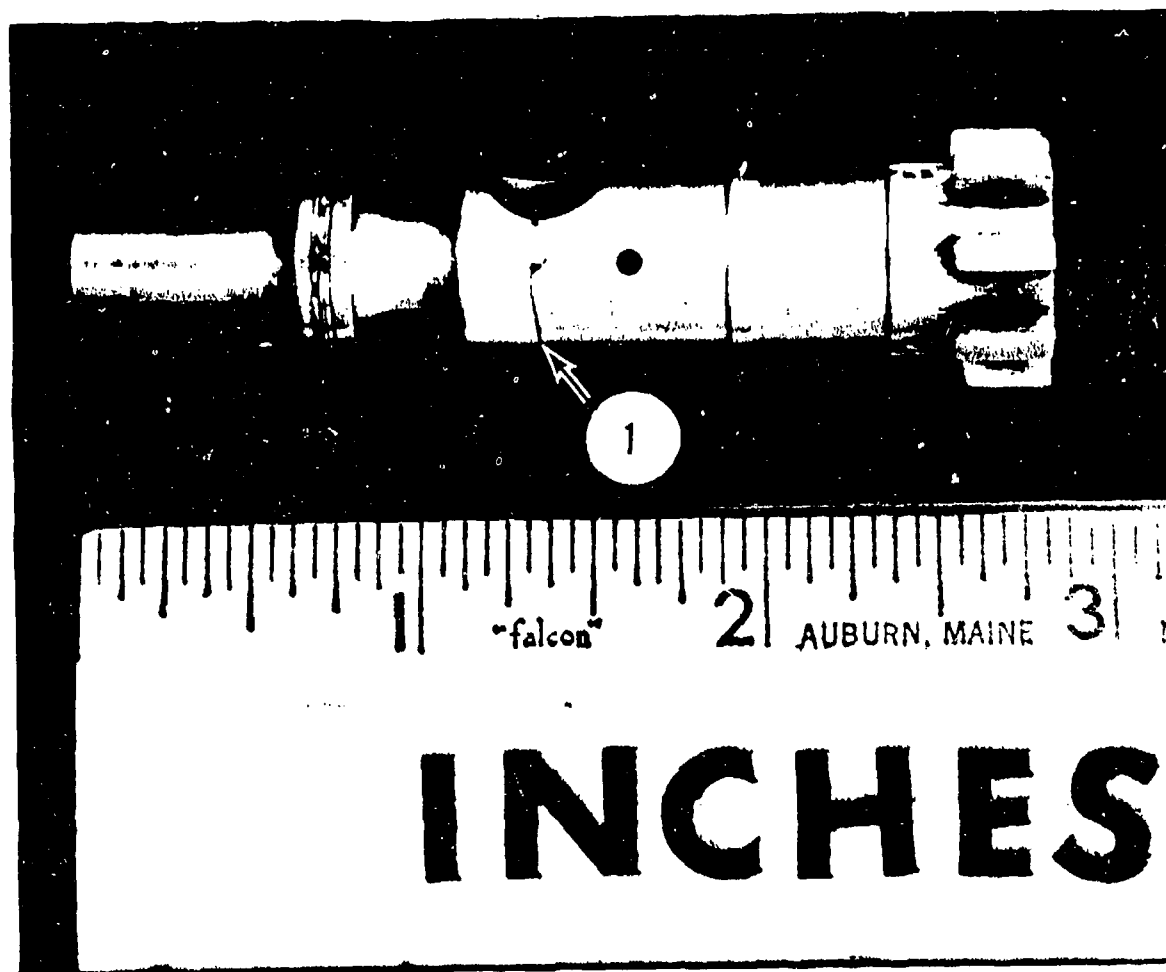


Figure 82

Bolt of Rifle, 5.56-mm, C-AR

1. Break through side of Bolt to Cam Pin Recess.

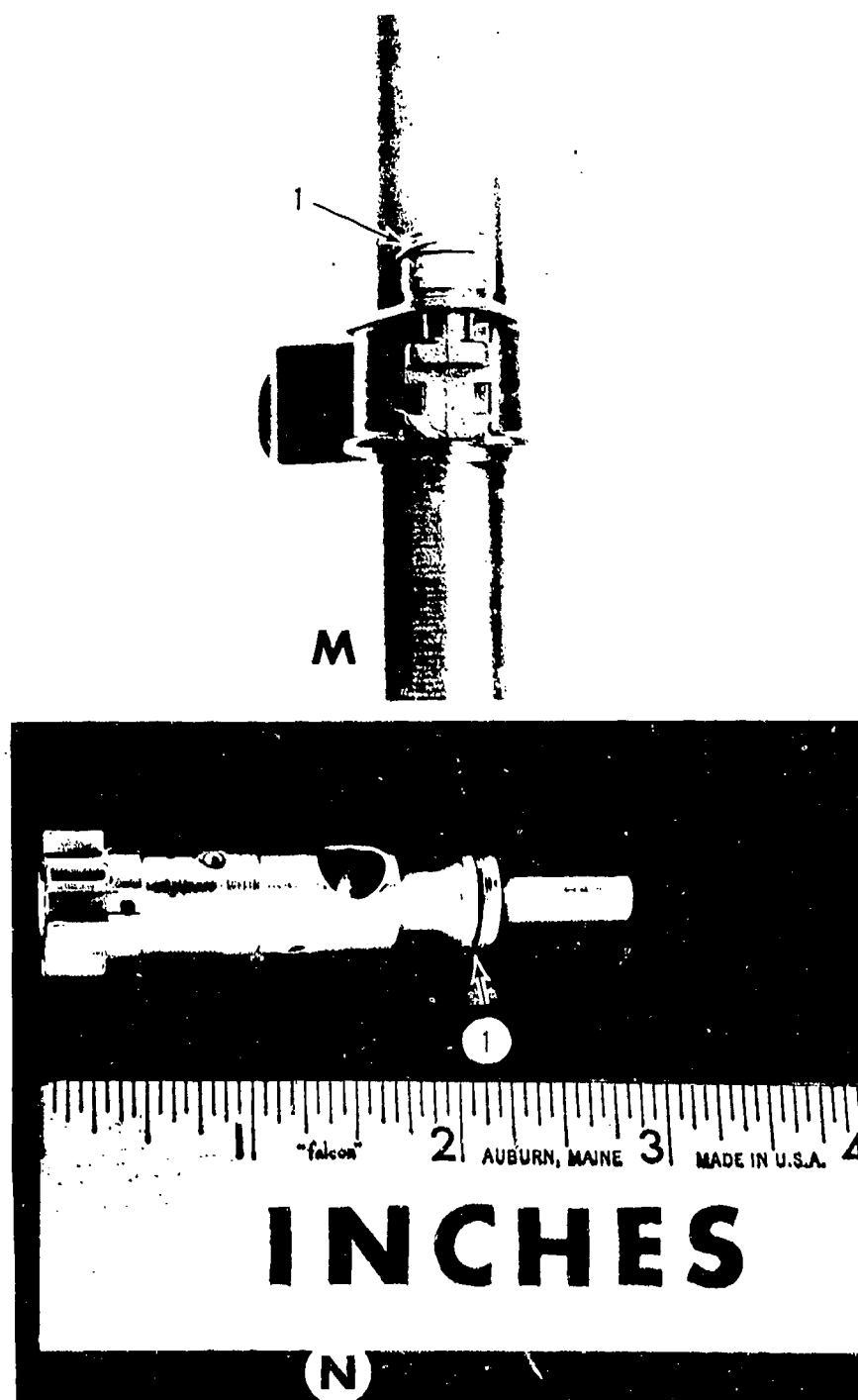


Figure 83

- M - Rifle, 5.56-mm, S-AR.
  - 1. Bent Gas Seal Ring on Gas Cylinder Plug.
- N - Rifle, 5.56-mm, C-AR.
  - 1. Bent Bolt Ring.



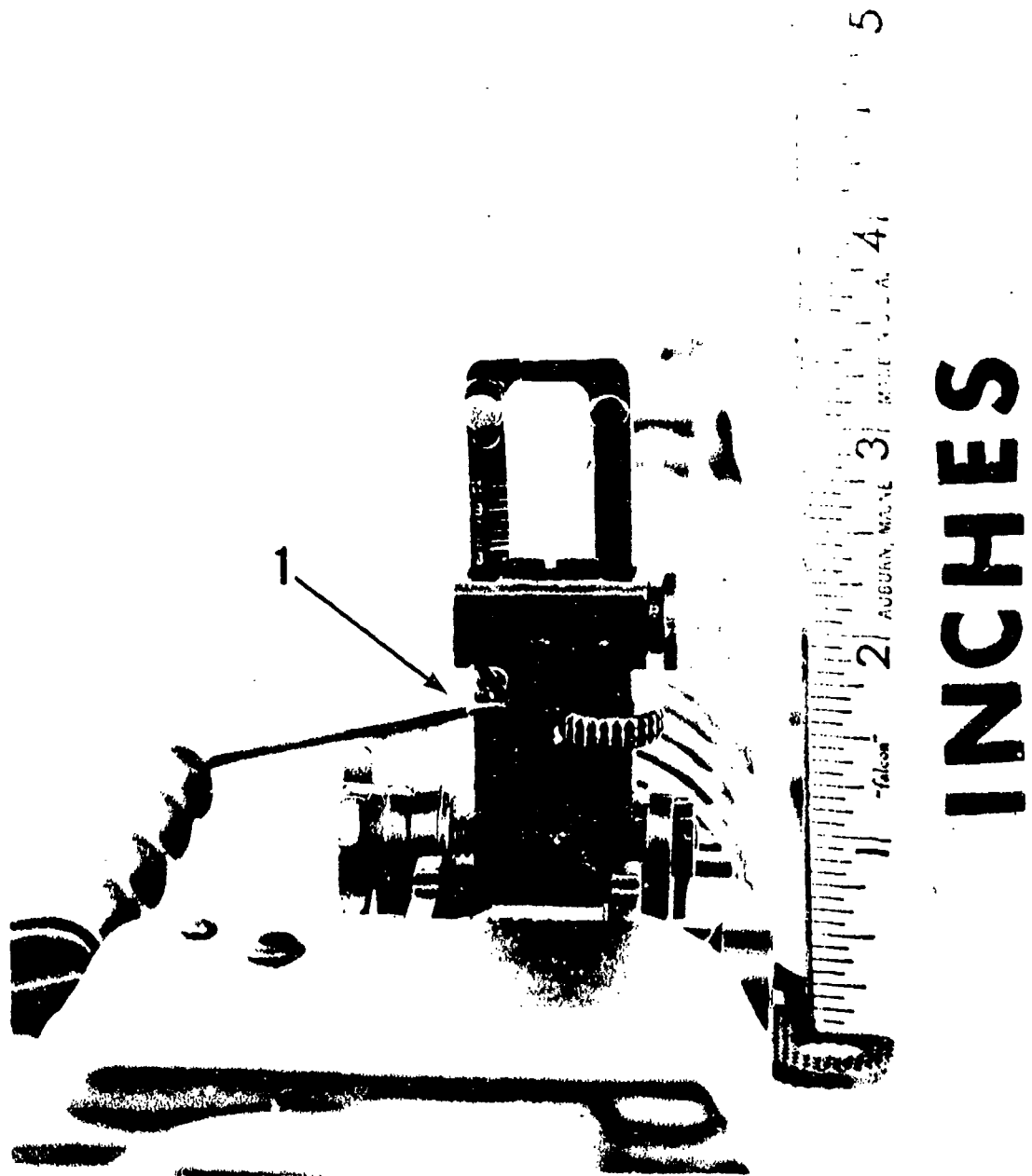


Figure 84

Machine Gun, 7.62-mm, M60

1. Bottom of Adjustable Range Plate Bent.

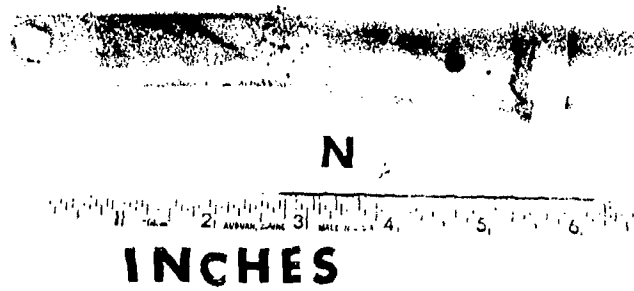


Figure 85

Mount, Tripod, Machine Gun, M122

- M - Bent Leg.
- N - Crack at bend occurring when attempt was made to straighten leg.

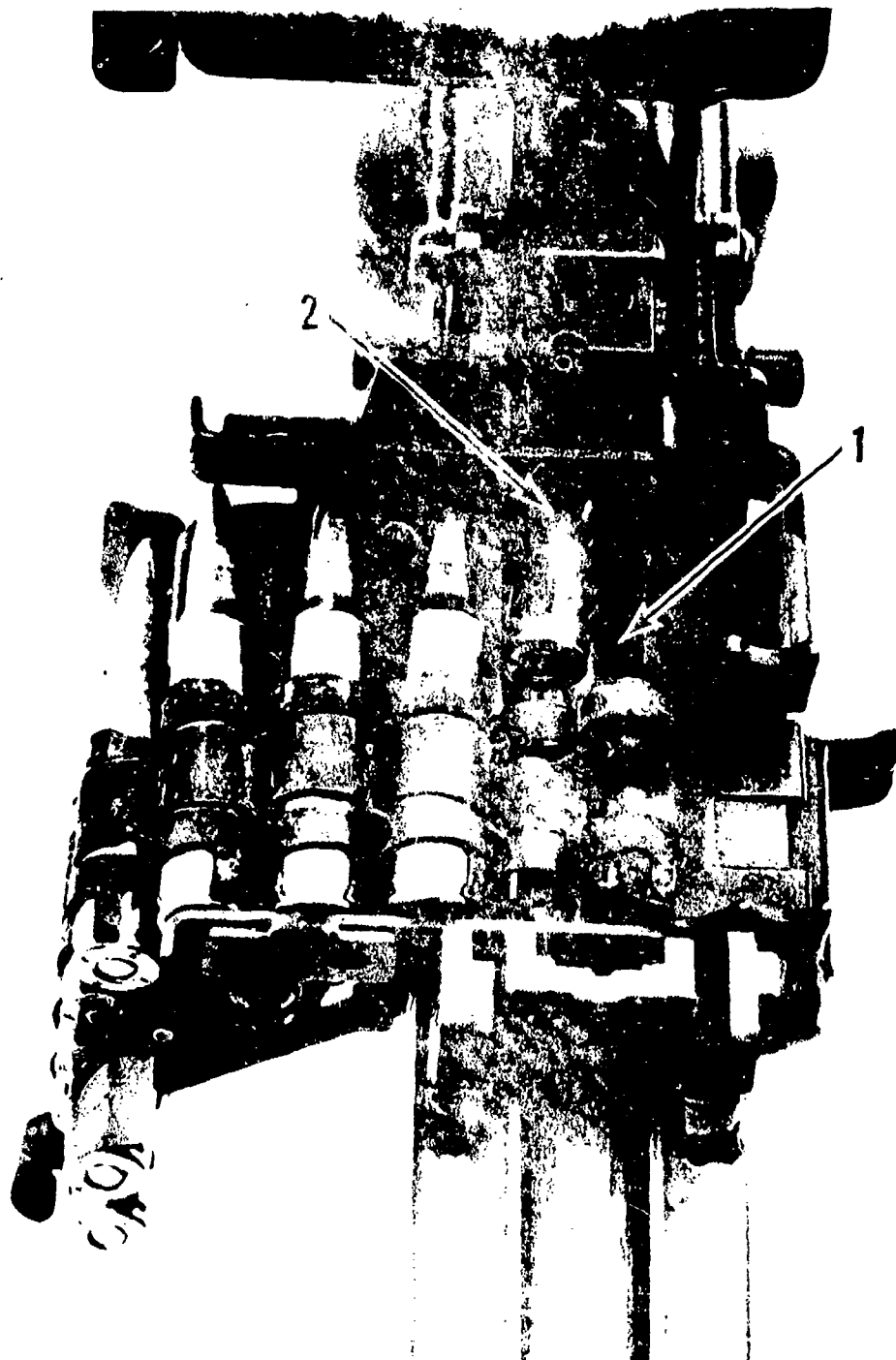


Figure 86

Machine Gun, 7.62-mm, M60

1. Unejected cartridge case.
2. Partial feed of new round.

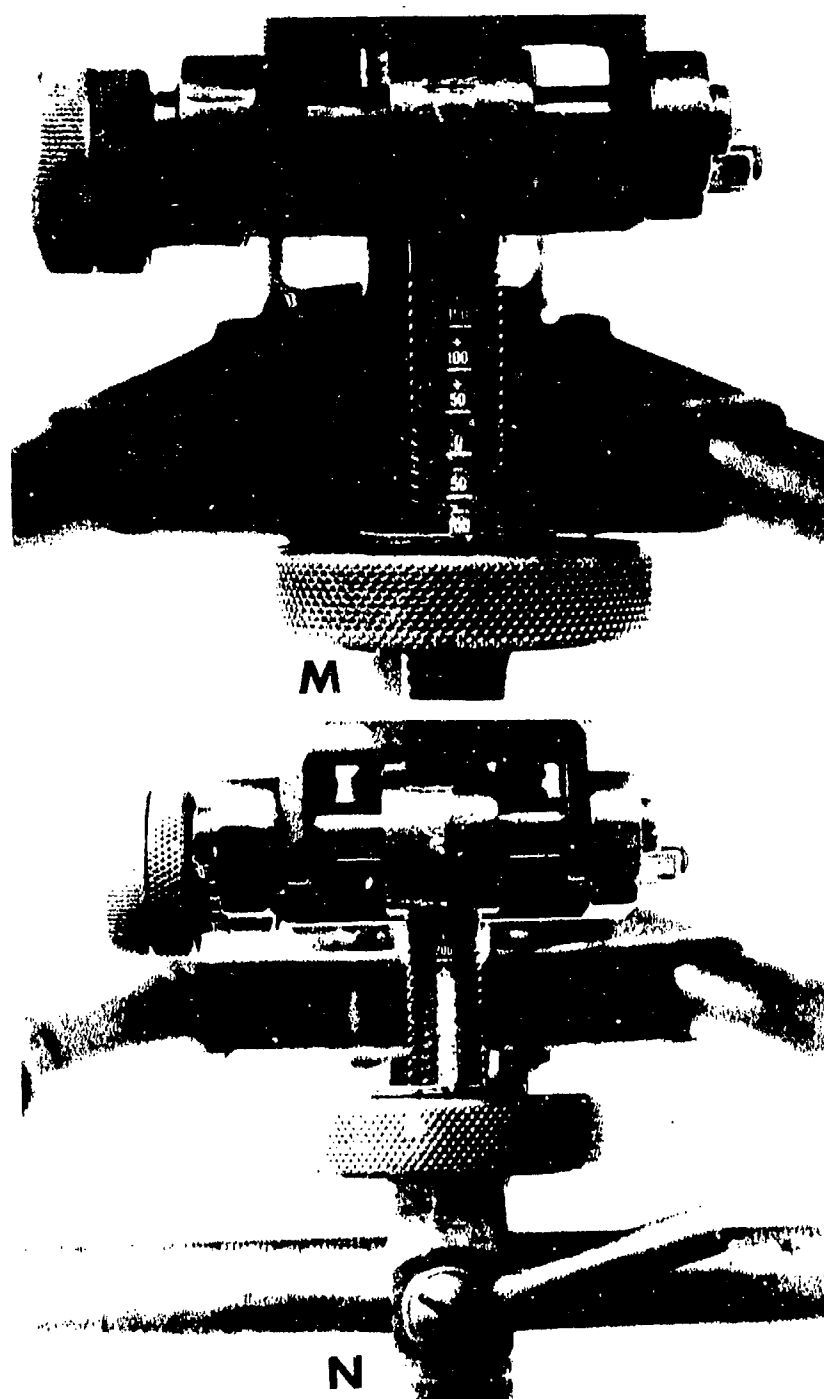
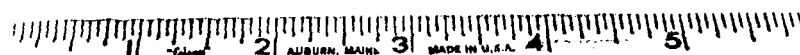


Figure 87

M and N. Elevating and Traversing Mechanism showing two positions in which the elevating handwheel "froze."



**INCHES**

**M**



**INCHES**

**N**

Figure 88

Machine Gun, 5.56-mm, Code S

M. Carrier and Piston Assembly showing broken Bolt.

N. Broken Bolt, Firing Pin, and Cam Pin.

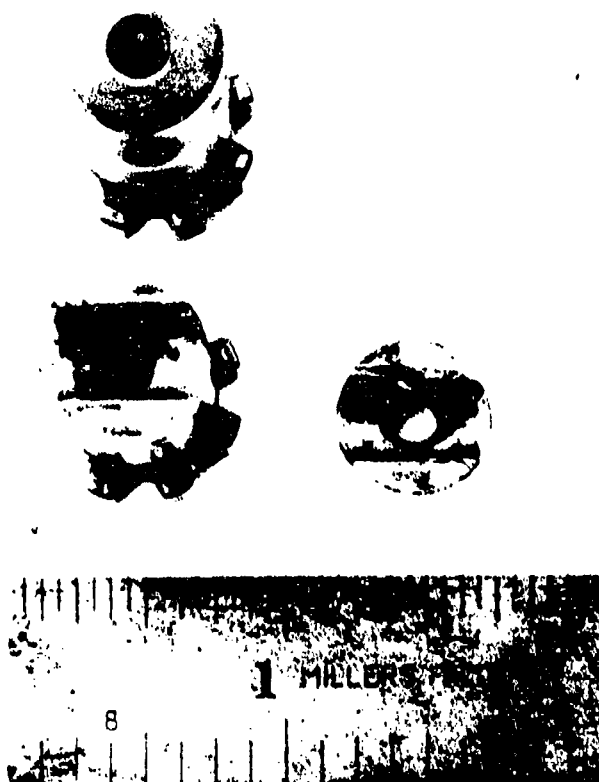


Figure 89

Bolt of Machine Gun, 5.56-mm, Code S,  
showing break across Cam Pin recess.

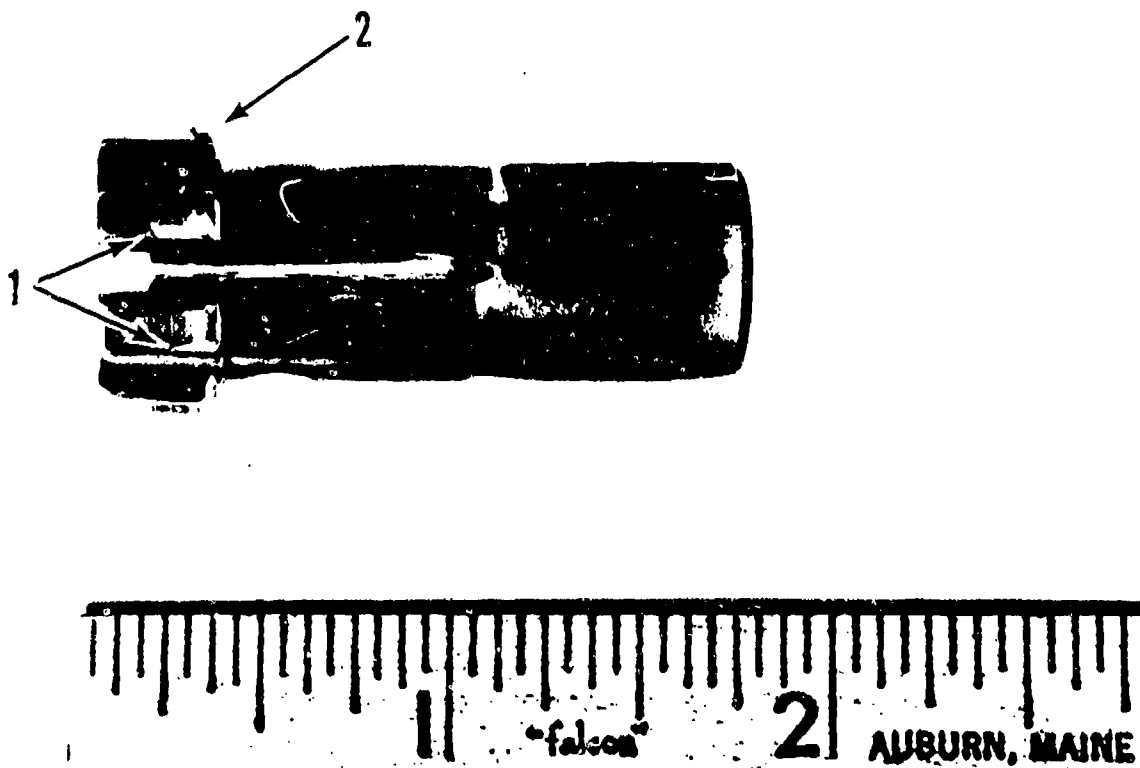


Figure 90.

Bolt of Machine Gun, 5.56-mm, Code S.

1 and 2. Burred Locking Lugs.

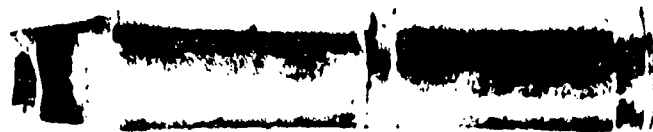


**INCHES**

Figure 91

Carrier and Cap Assembly of Machine Gun, 5.56-mm, Code S,  
showing broken Roller Retaining Washer which caused inad-  
vertent disassembly.

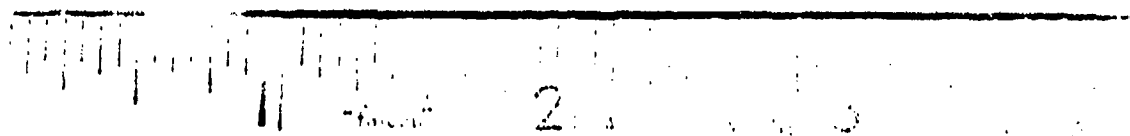
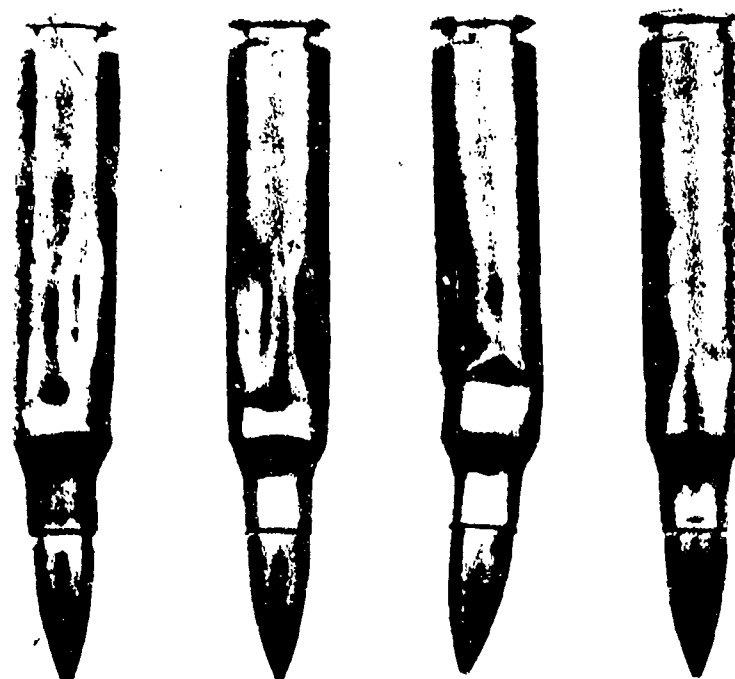




**INCH**

Figure 92

Case of 5.56-mm Cartridge showing  
rupture sustained during firing of  
the Machine Gun, 5.56-mm, Code S.



**INCHES**

Figure 93

Cartridges, 5.56-mm, M193, showing  
damage caused by occurrence of bolt  
override with the Machine Gun,  
5.56-mm, Code S.

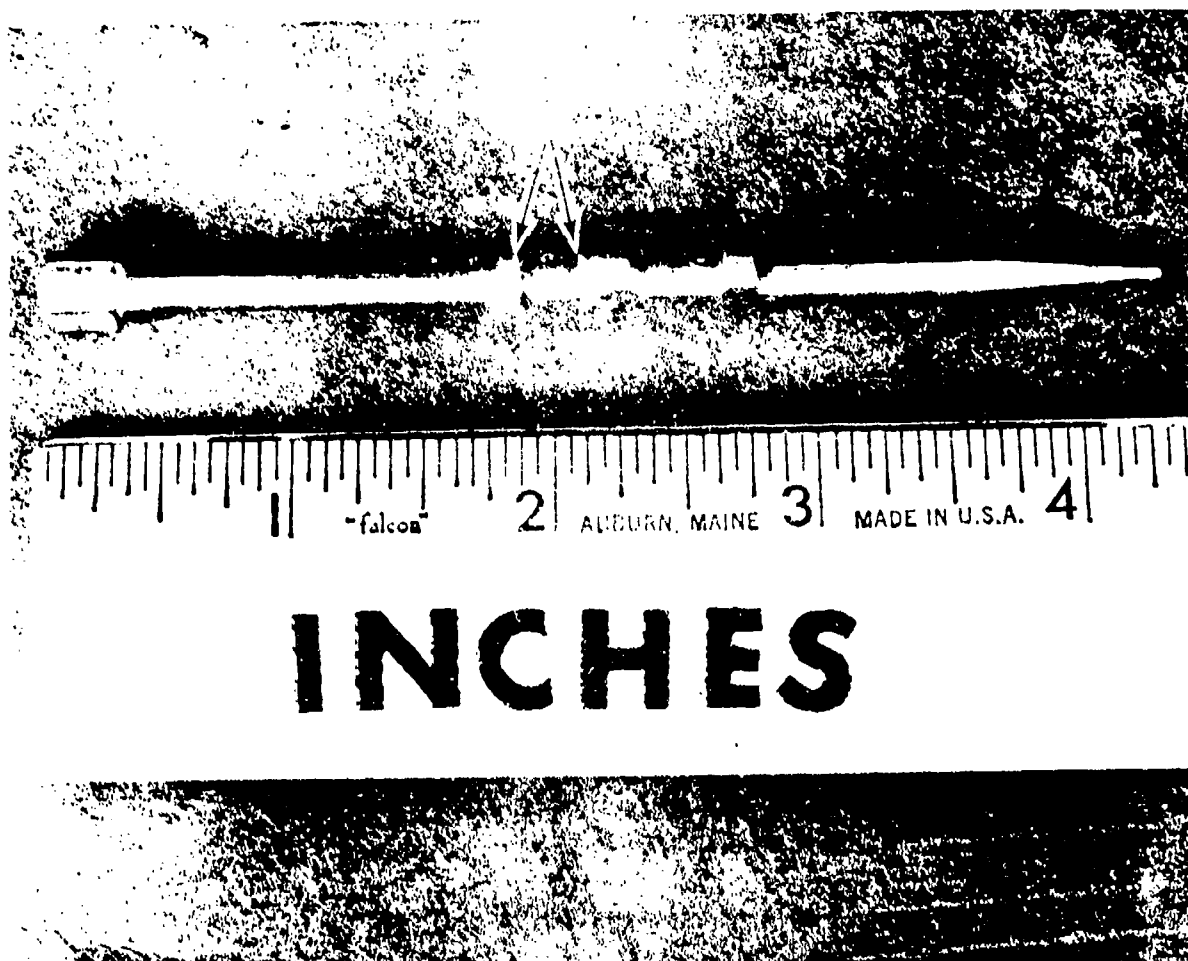


Figure 94  
Machine Gun, 5.56-mm, Code S

1. Burred Firing Pin.

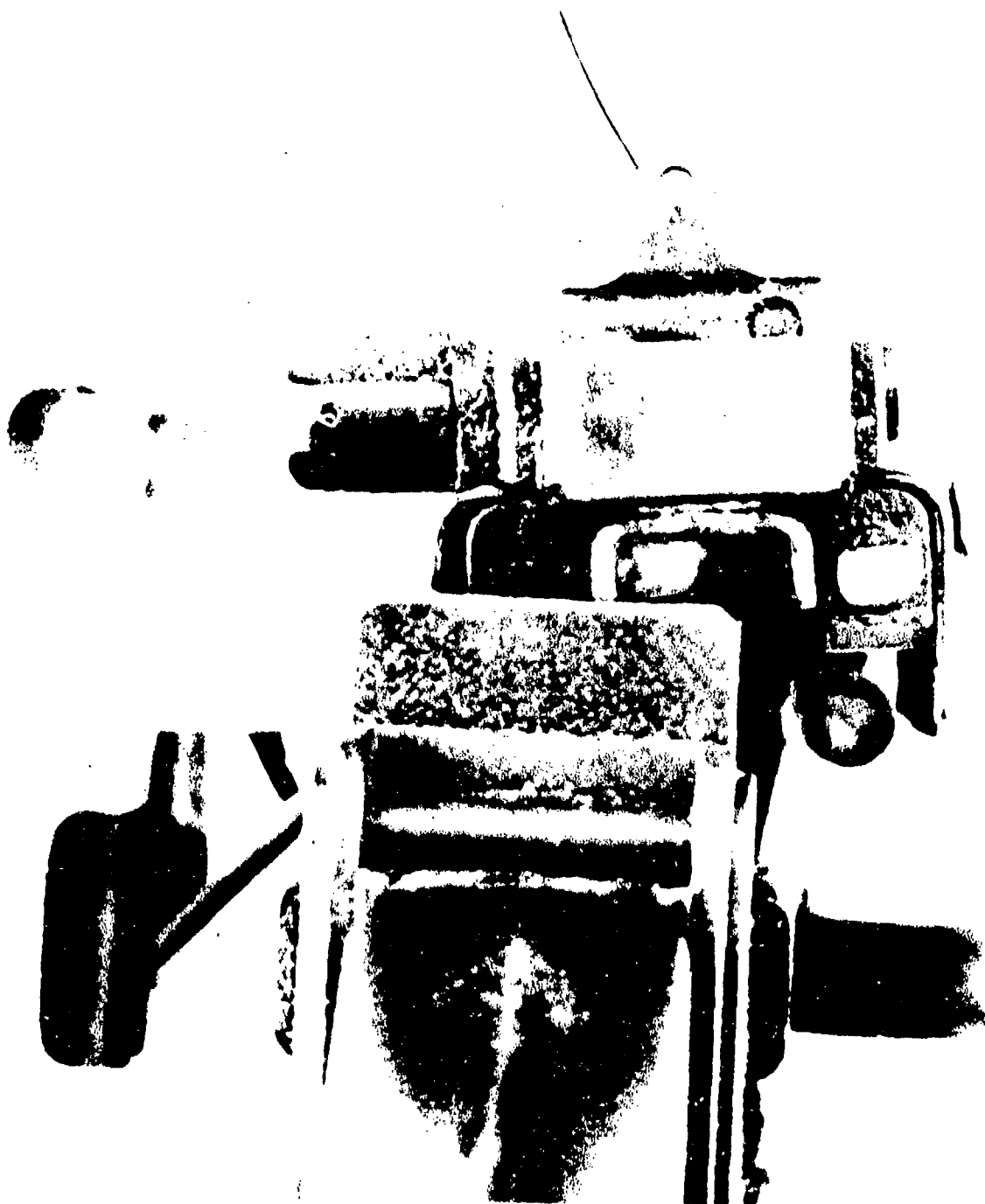


Figure 95.

Machine Gun, 5.56-mm, Code S, Showing Damaged Feed Cover Assembly

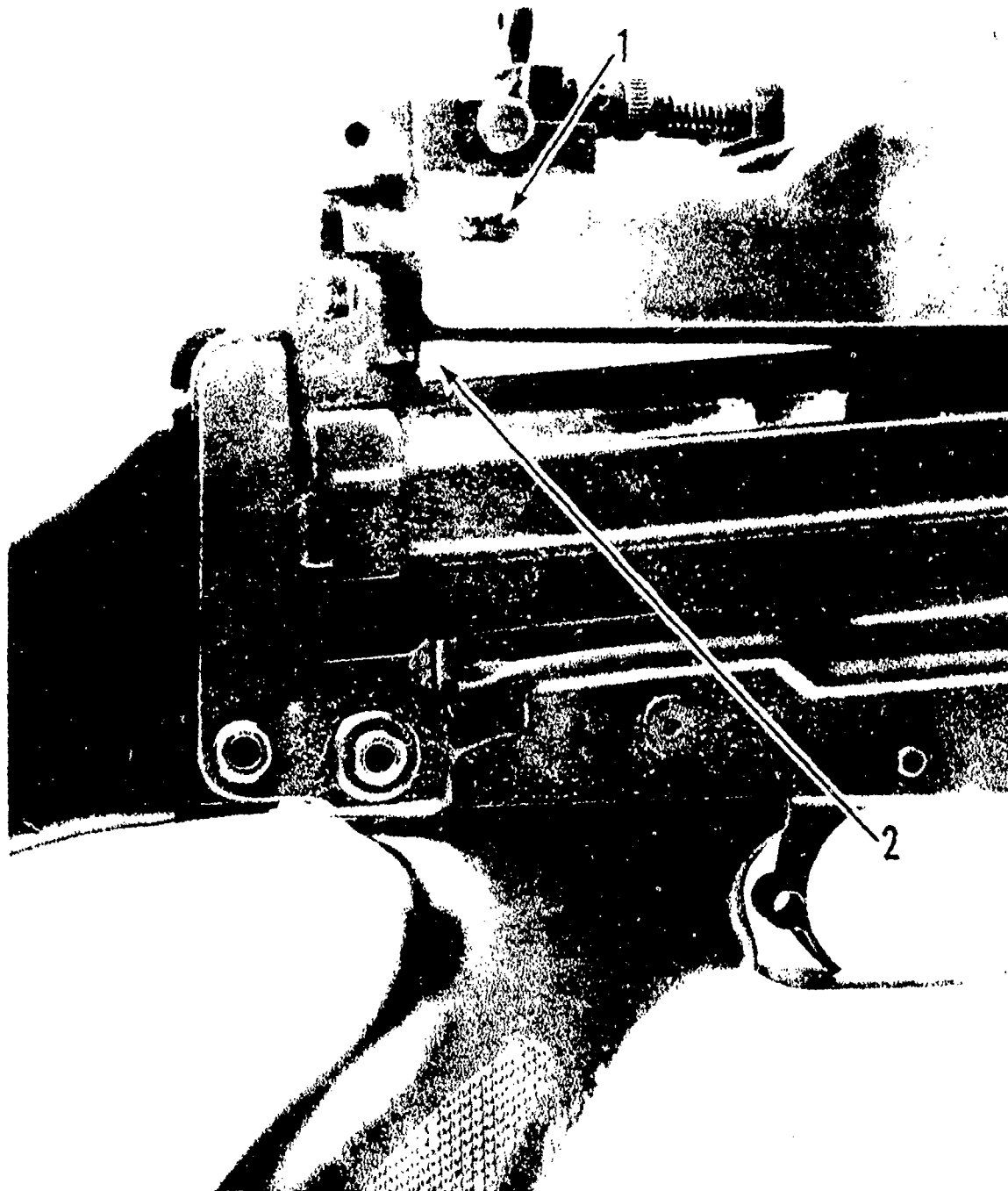


Figure 96

Machine Gun, 5.56-mm, Code S

1. Missing Feed Cover Latch Handle.
2. Damage Preventing Closure of Feed Cover Assembly.

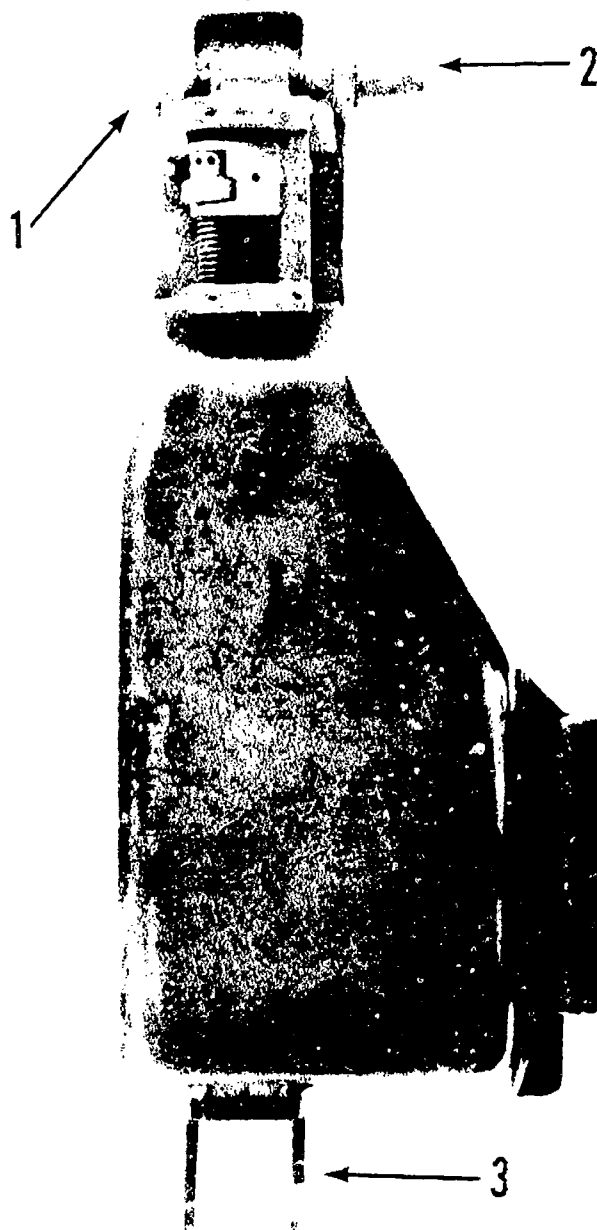
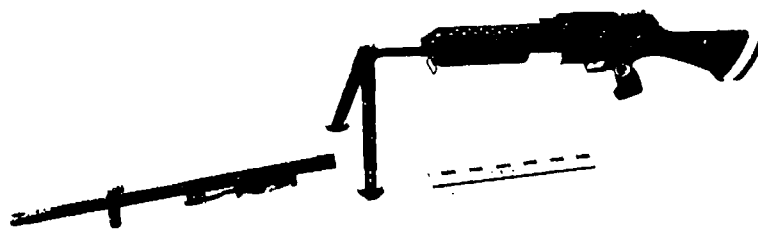


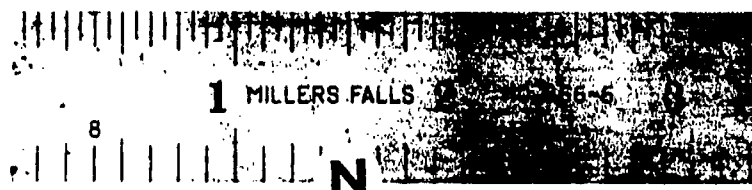
Figure 97

Machine Gun, 5.56-mm, Code S

1. Missing Feed Cover Latch Handle.
2. Bent Windage Knob.
3. Be Feed Cover Assembly Hinge.



**M**



**Figure 98**

**Machine Gun, 5.56-mm, S-LMG**

- M - Separation of Barrel Assembly from Machine Gun.**
- N - Top figure is case of 5.56-mm cartridge showing shear. Bottom figures are undamaged 5.56-mm cartridge case, and Cartridge, Ball, 5.56-mm, M193.**

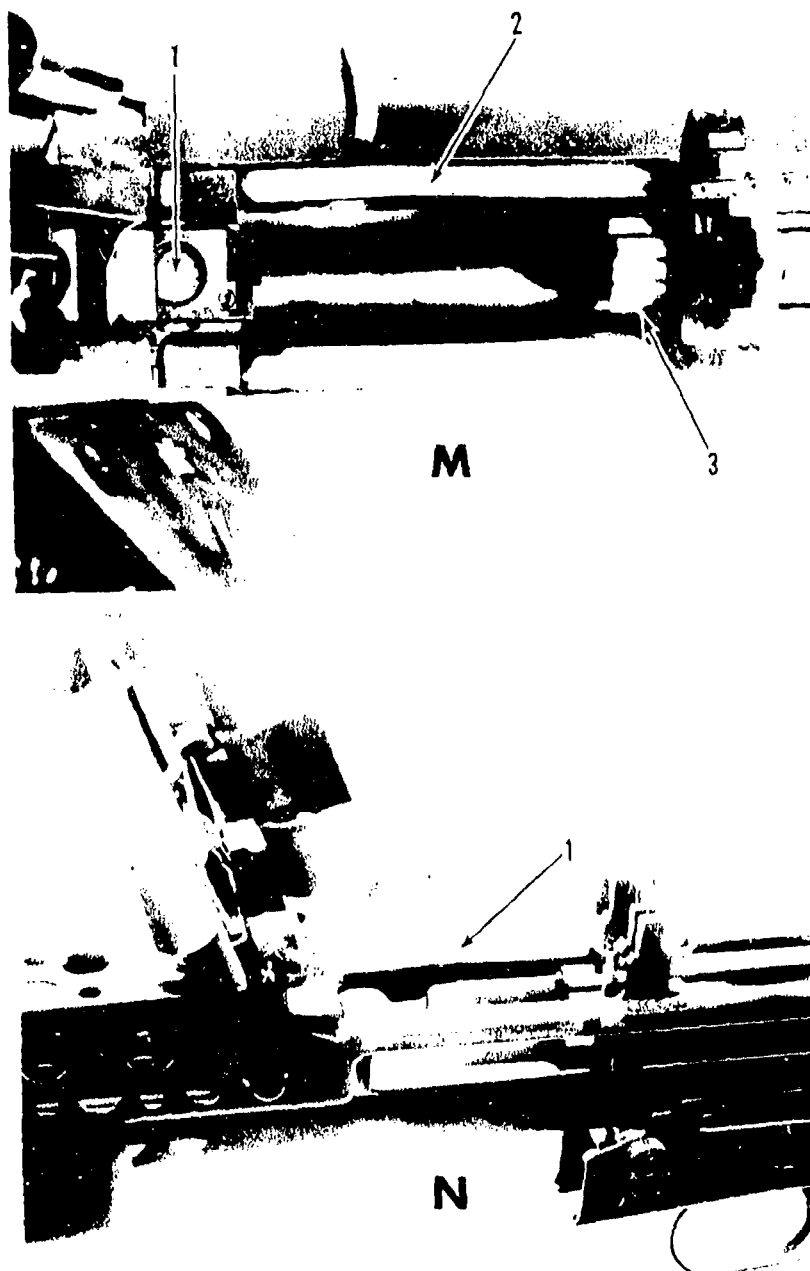
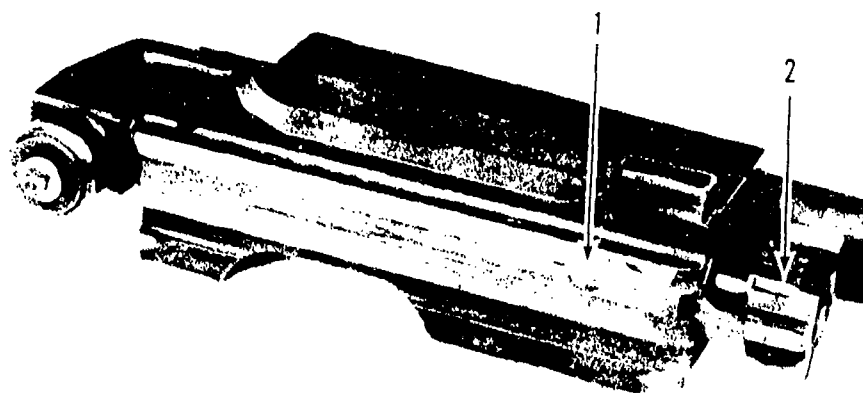


Figure 99

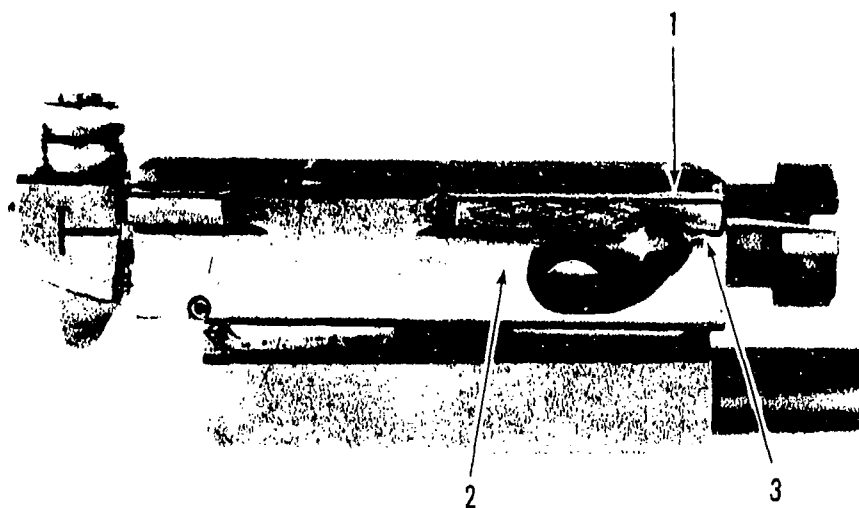
Machine Gun, 5.56-mm, S-IMG

- M - Top view of Receiver Assembly and Head of Bolt.
1. Barrel Locking Pin Recess with Barrel Locking Pin Missing.
  2. Bow in side of Receiver.
  3. Locking Lug Sheared from Bolt.
- N - Same as M (side view) showing:
1. Bow in side of Receiver.





**M**

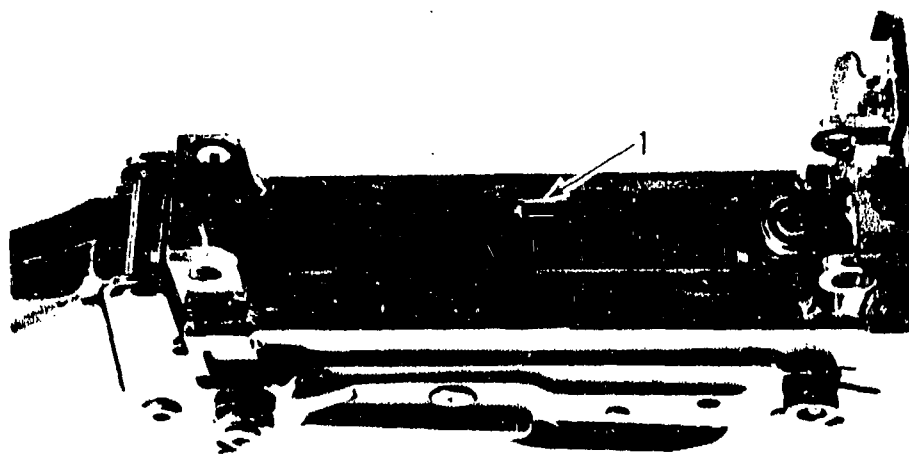


**N**

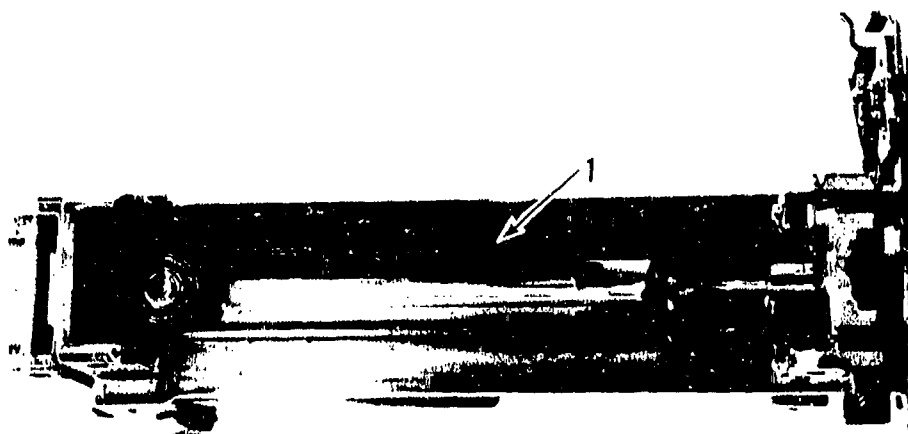
Figure 100

Machine Gun, 5.56-mm, S-LMG

- M - Oblique view of Carrier and Piston Assembly.
  - 1. Crack in Bolt Carrier.
  - 2. Locking Lug Sheared from Bolt.
- N - Same as M (side view) showing:
  - 1, 2, and 3. Cracks in Bolt Carrier.



M



N

Figure 101

Machine Gun, 5.56-mm, Code S

- M - Oblique view of Receiver.
- 1. Bent Guide Rail.
- N - Top view of Receiver.
- 1. Bent Guide Rail.

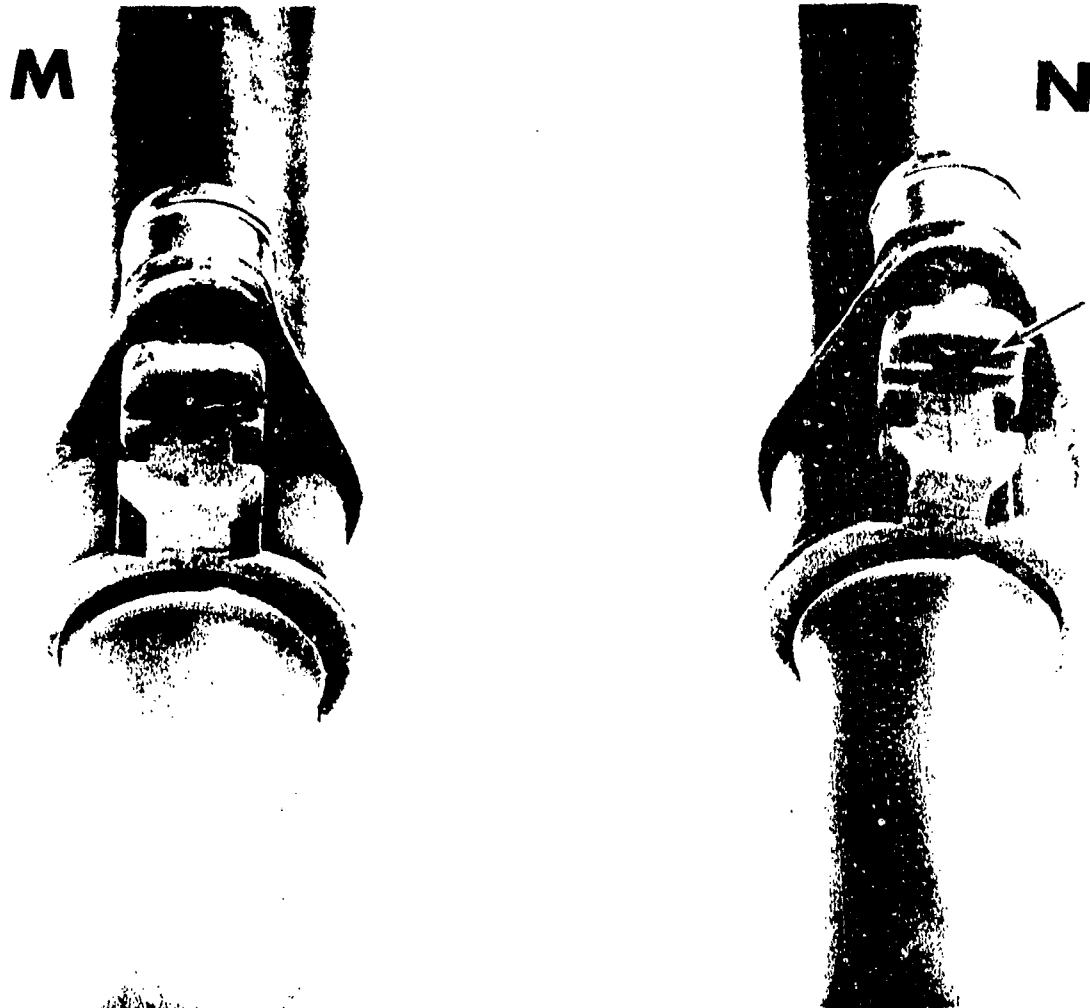


Figure 102

Machine Gun, 5.56-mm, Code S

- M - Bottom front view of Front Sight Housing with Gas Cylinder Plug and Bayonet Stud.
- N - Same as M showing:
  - 1. Perforation through Gas Cylinder Plug and Bayonet Stud.

## APPENDIX VI -- MAINTENANCE EVALUATION

### 1. Summary of Maintenance Operations.

#### a. General

The maintenance operations performed on all of the candidate weapons were listed in three types: daily scheduled maintenance, weekly scheduled maintenance, and unscheduled maintenance. Sub-Test No 15, Maintenance, and Sub-Test No 16, Durability and Reliability, contain an evaluation of the candidate weapons with respect to maintenance, and durability and reliability.

#### b. Daily Scheduled Maintenance.

All of the candidate weapons were field stripped, cleaned, and lubricated after each day's firing. The candidate weapons were disassembled, cleaned, lubricated, and reassembled using the procedures outlined in the appropriate POMM's. Test soldiers were instructed to inspect for and report any broken, cracked, missing or worn parts discovered. The candidate weapons were cleaned on the range or in the field by laying the weapons out on strips of salvage canvas. While this condition did not exactly duplicate conditions usually encountered in combat, it facilitated the procedure and prevented the unnecessary loss of parts.

#### c. Weekly Scheduled Maintenance.

When testing time permitted, all of the candidate weapons were detail disassembled and cleaned on a weekly basis using solvent. The candidate weapons were detail inspected by a test officer or test non-commissioned officer for broken, cracked, missing, or worn parts.

#### d. Unscheduled Maintenance.

Throughout all testing whenever unscheduled maintenance was required, it was performed and noted. During the conduct of sub-tests, such as Sub-Test No 3, Rate of Fire, where large numbers of rounds were fired in a short period of time resulting in heavy carbon build-up, ammunition residue, and loss of lubrication, the candidate weapons were cleaned or lubricated as was determined necessary by the test officer. Any excessive requirement for cleaning of a particular weapon was noted. Whenever malfunctions or excessive stoppages occurred, the candidate weapons were inspected in an attempt to determine the cause. Note was made of any action, such as parts replacement, necessary to return the candidate weapon to operating condition.

### 2. Basis for Evaluating Maintenance Packages

#### a. General

Sub-Test No 15, Maintenance, contains an evaluation of the

suitability of the maintenance package for each of the candidate weapons. The suitability of items received in the maintenance package was evaluated, and any items which were considered necessary but were not received were listed.

b. Minimum Requirements for a POMM.

The POMM of each candidate weapon was evaluated using the following format as the minimum information required in each manual:

- (1) Description and Data.
  - (a) Description.
  - (b) Tabulated data.
- (2) Operating Instructions.
  - (a) Service upon receipt of materiel.
  - (b) Controls and instruments.
  - (c) Operation under usual conditions.
  - (d) Operation of materiel used in conjunction with major items.
  - (e) Operation under unusual conditions.
- (3) Maintenance Instructions.
  - (a) Special organizational tools and equipment.
  - (b) Lubrication.
  - (c) Preventative maintenance services.
  - (d) Trouble shooting.
  - (e) Purpose, functioning and relationship of the item.
- (4) Repair Parts and Special Tools List.

APPENDIX VII -- RANGE DIAGRAMS

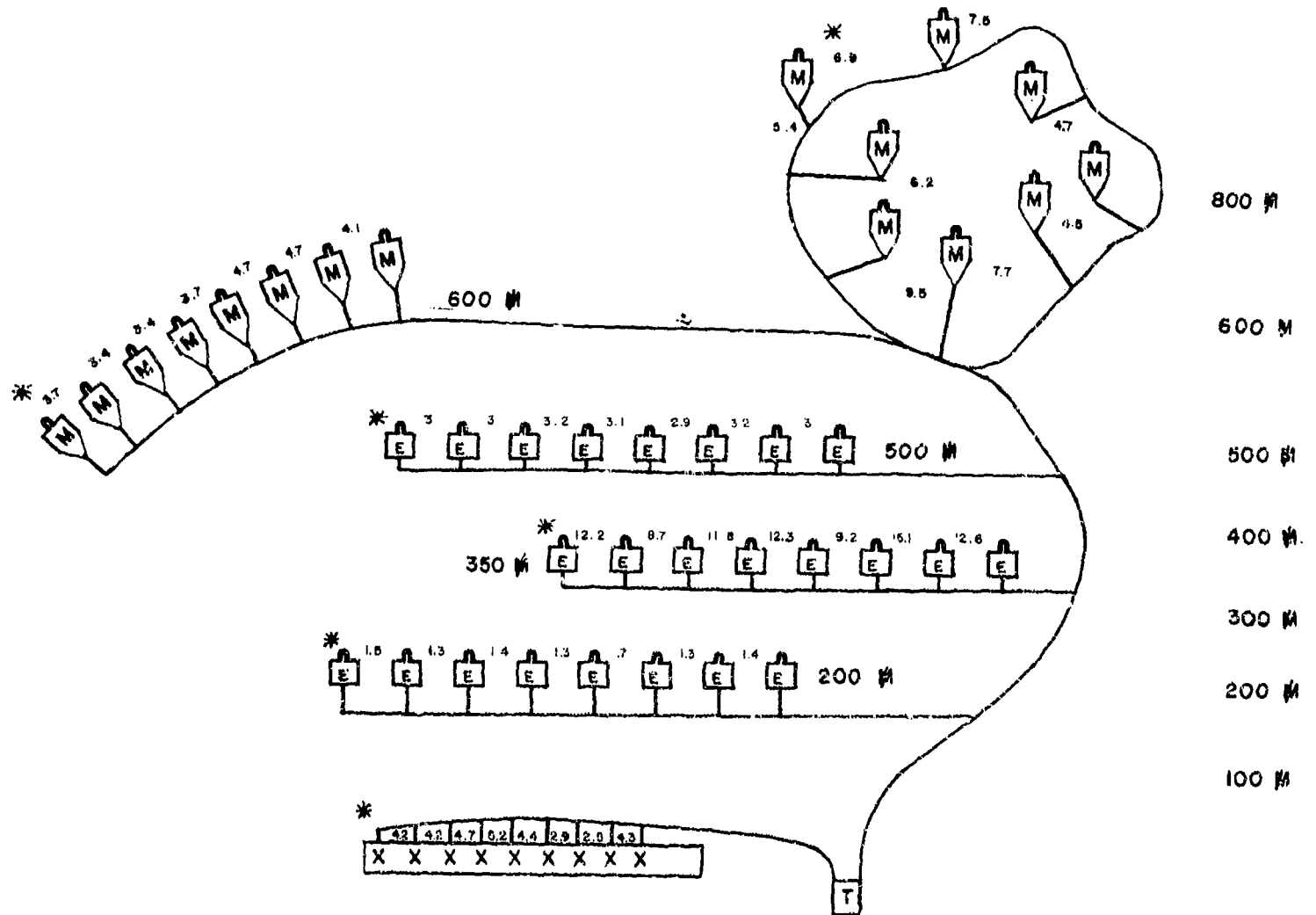


Figure 1

RATE OF FIRE, RANGE "A"  
RIFLES, CARBINES, AND AUTOMATIC RIFLES

- X - Squad firing positions.
- E - "E" type target.
- M - "M" type target.
- M - Meters
- T - Instrumentation trailer.
- \* - Distance between targets in meters.

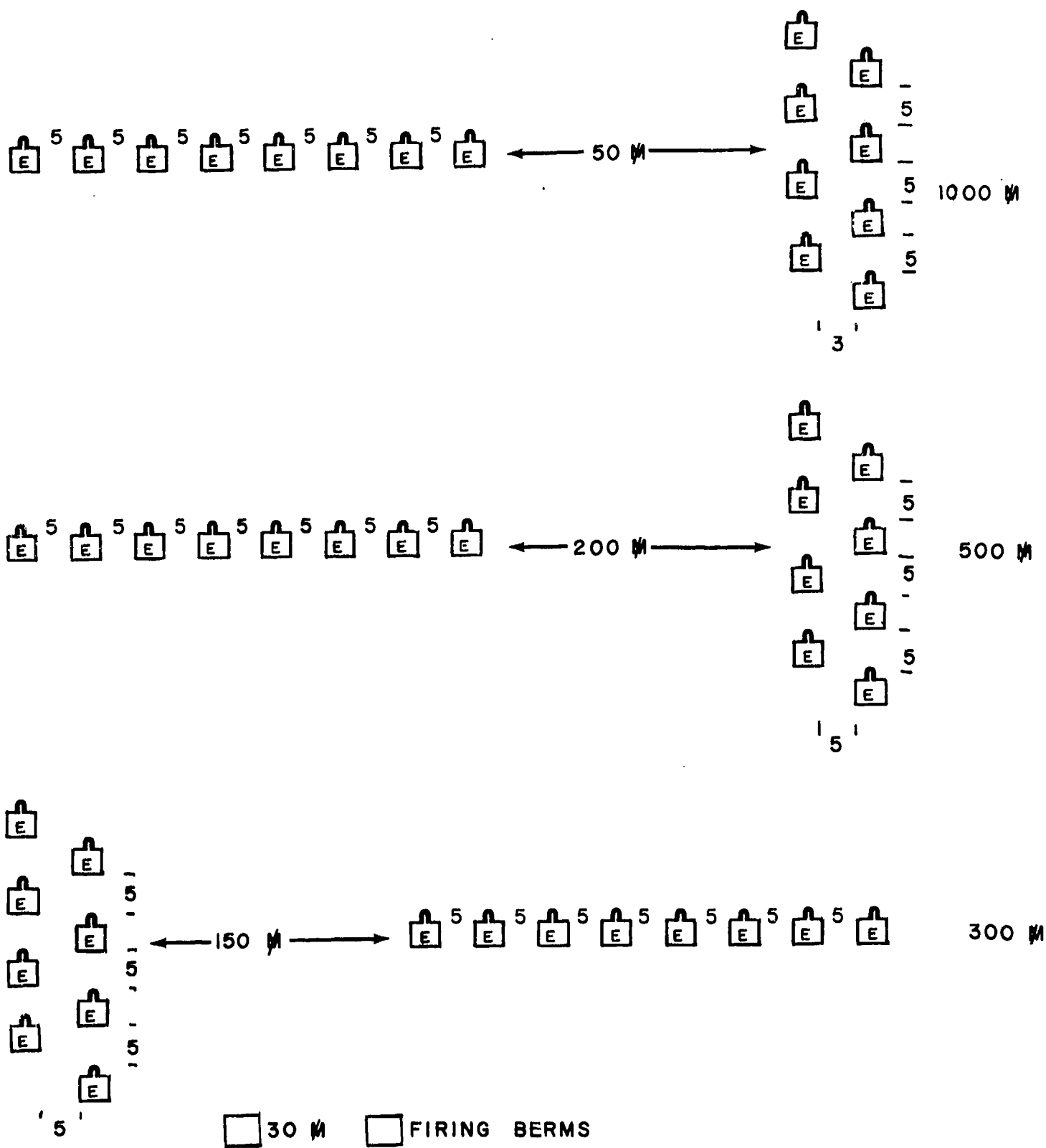


Figure 2

#### RATE OF FIRE, RANGE "B"

All "E" type silhouettes.

The array at each range was staggered so that rounds fired at that array would not hit other arrays.

VII-2

ST #4 SIGHTS  
MG

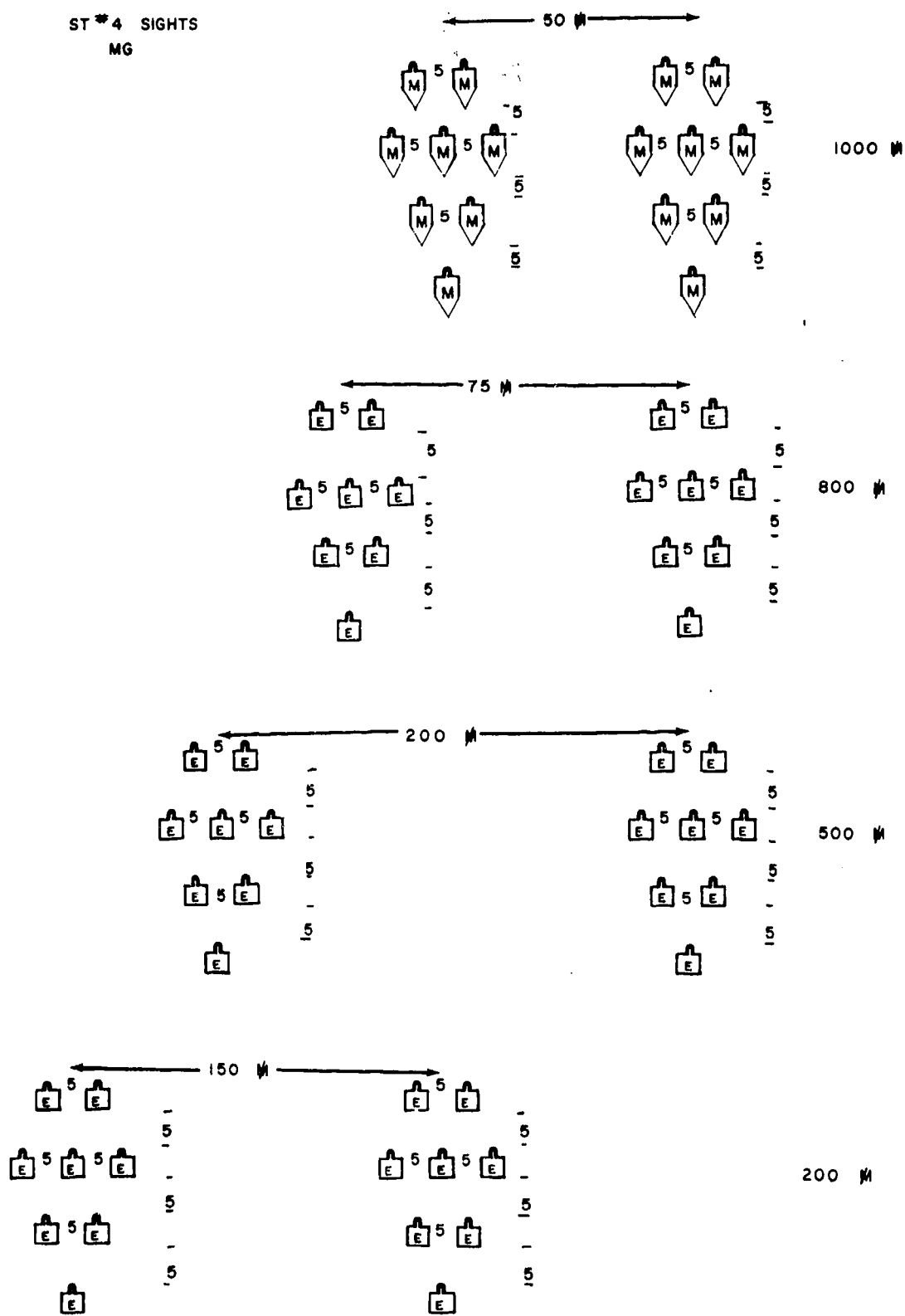


Figure 3

SIGHTS RANGE, MACHINE GUN

The array at each range was staggered so that rounds fired at that array would not hit other arrays.

VII-3



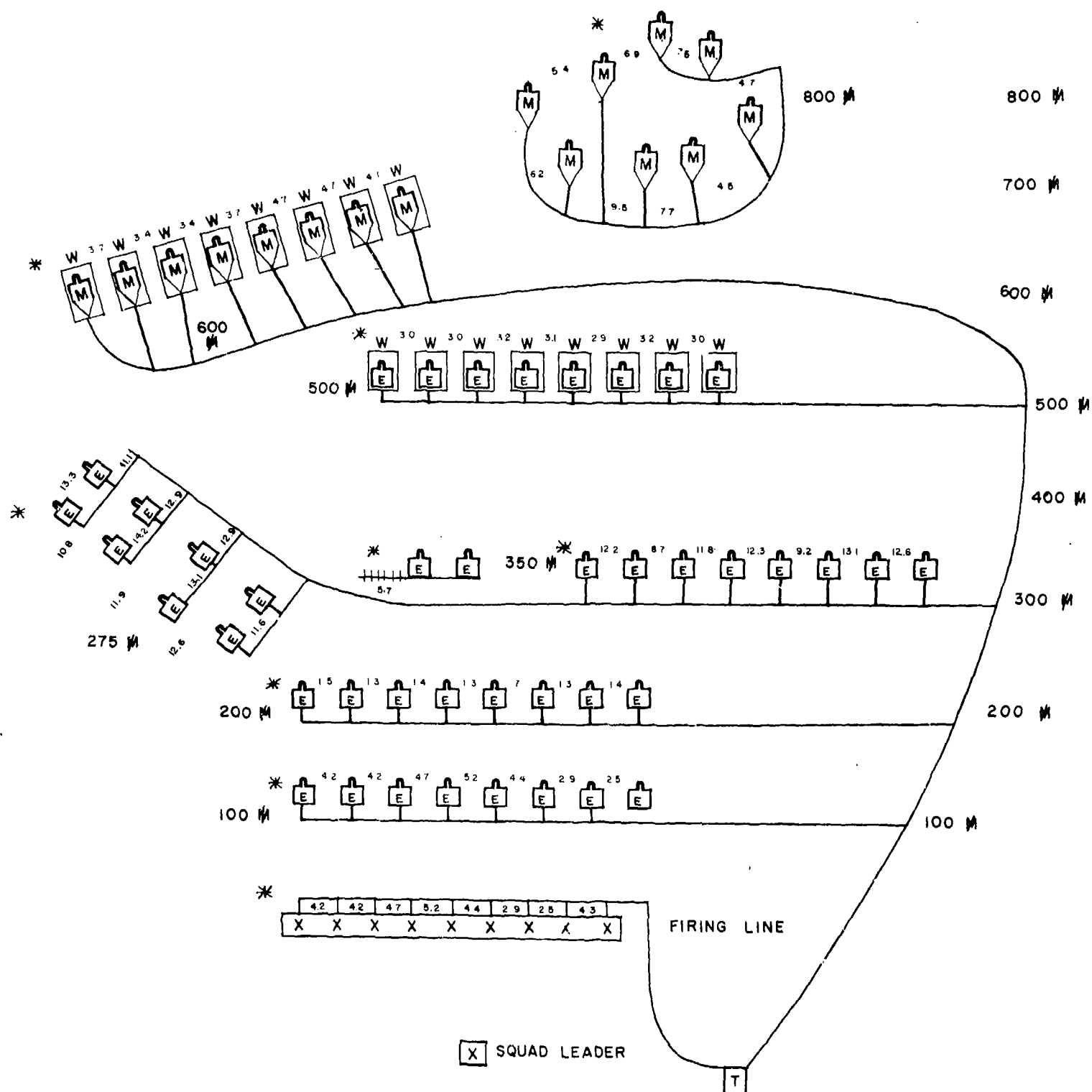


Figure 4

DAY DEFENSE RANGE

- M - "M" type silhouette target.
- E - "E" type silhouette target.
- M - Meters.
- W - Witness panel.
- X - Squad member firing positions.
- T - Instrumentation trailer.
- \* - Distance between targets in meters.

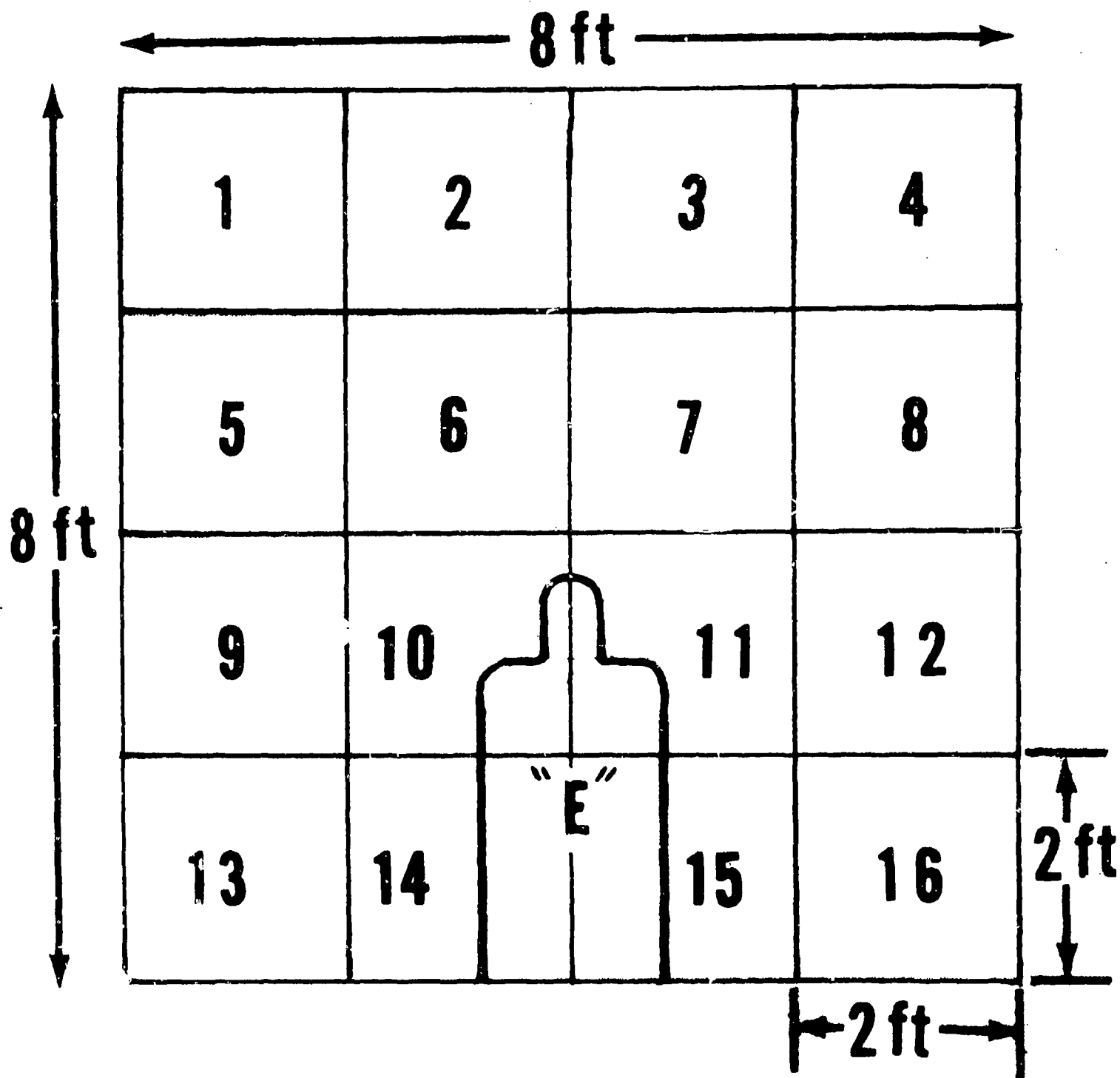


Figure 5

DAY DEFENSE RANGE  
SUPPRESSIVE FIRE WITNESS PANEL

E - "E" type target.

VII-5

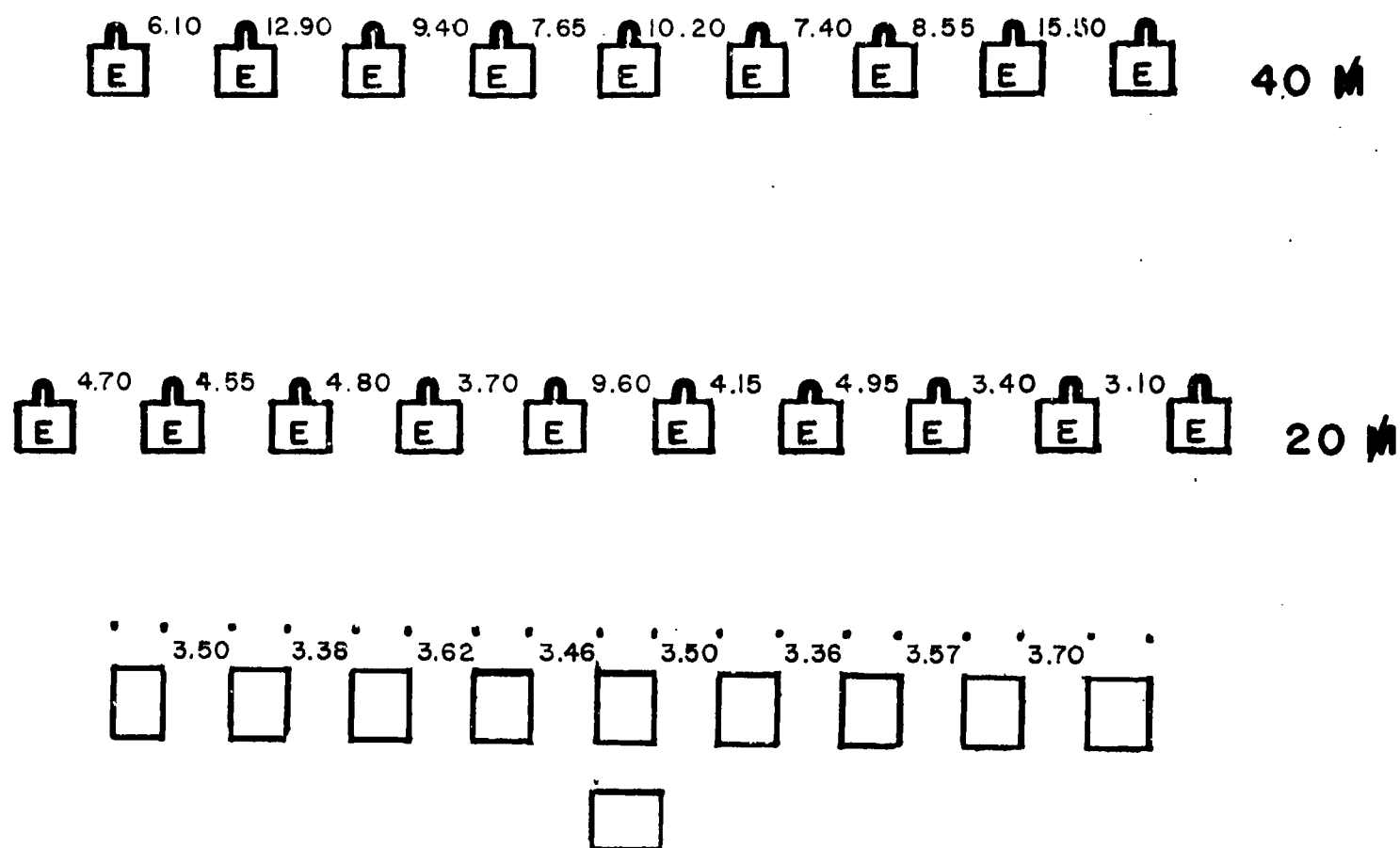
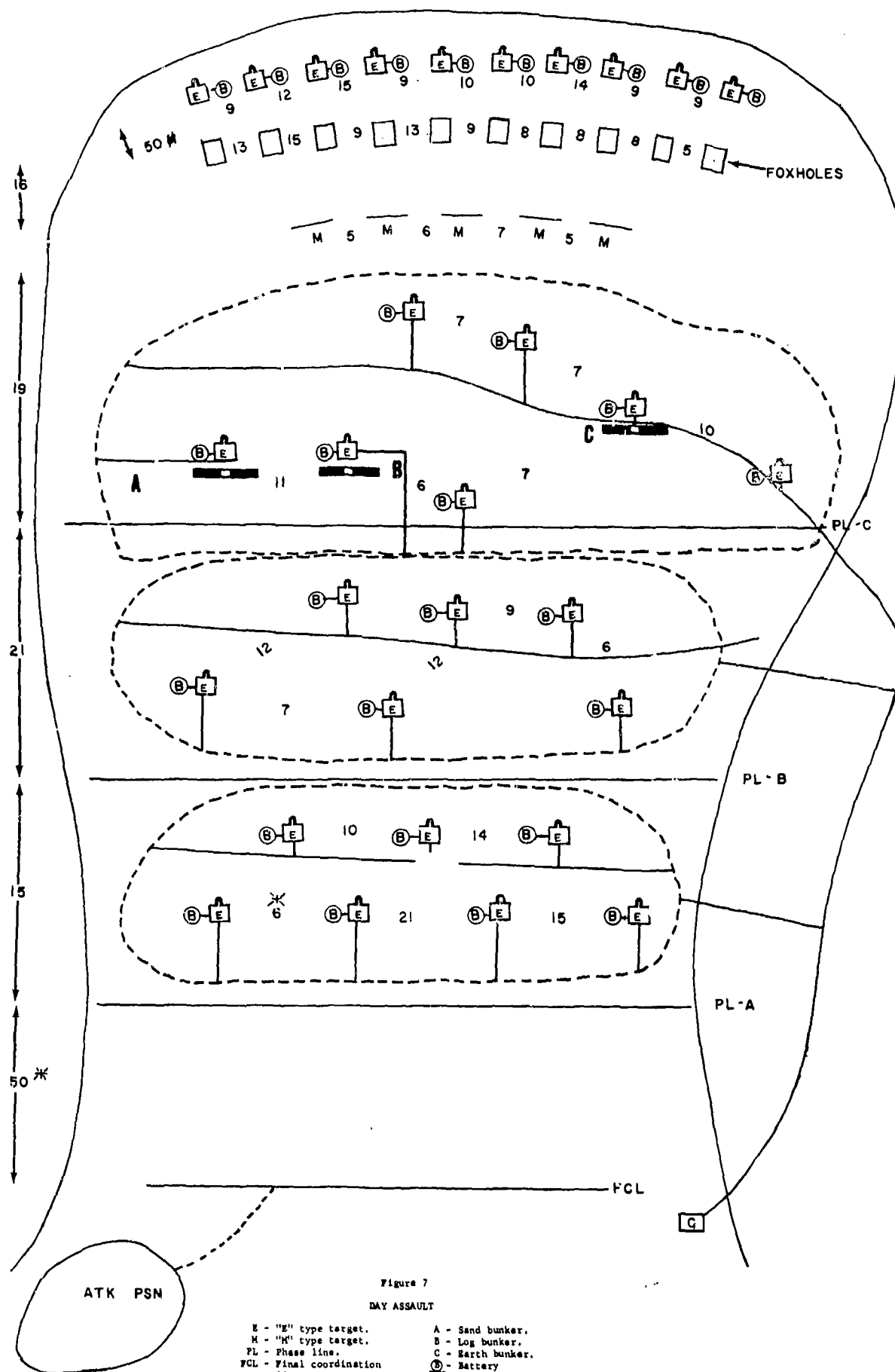


Figure 6

# NIGHT DEFENSE RANGE

- E - "E" type target.
- .. - Sector stakes.
- - Foxholes.
- M - Meters.



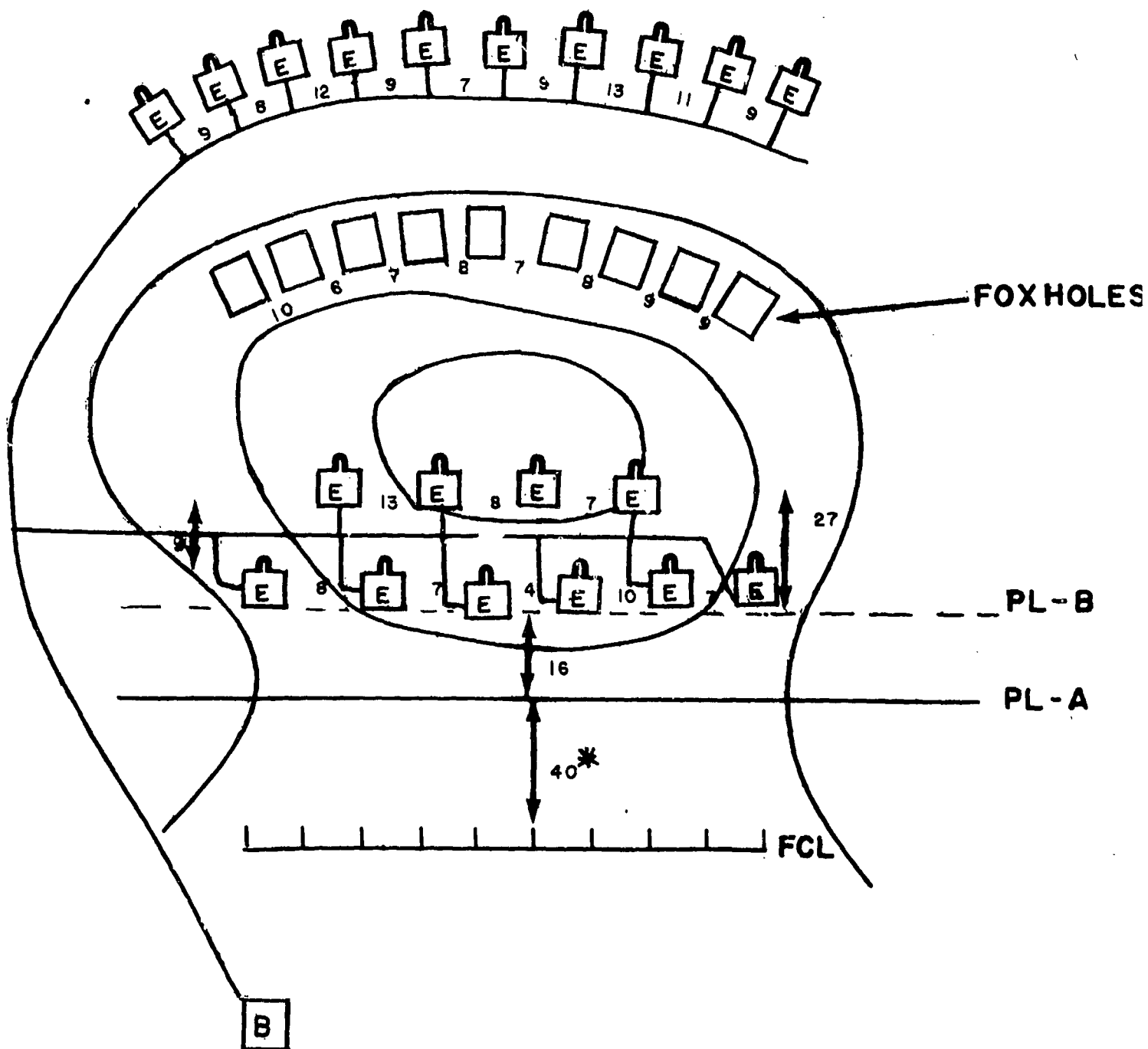


Figure 8

# NIGHT ASSAULT RANGE

- B - Control bunker.
- E - "E" type target.
- PL - Phase line.
- FCL - Final coordination line.
- \* - All measurements between targets and arrays are in meters.

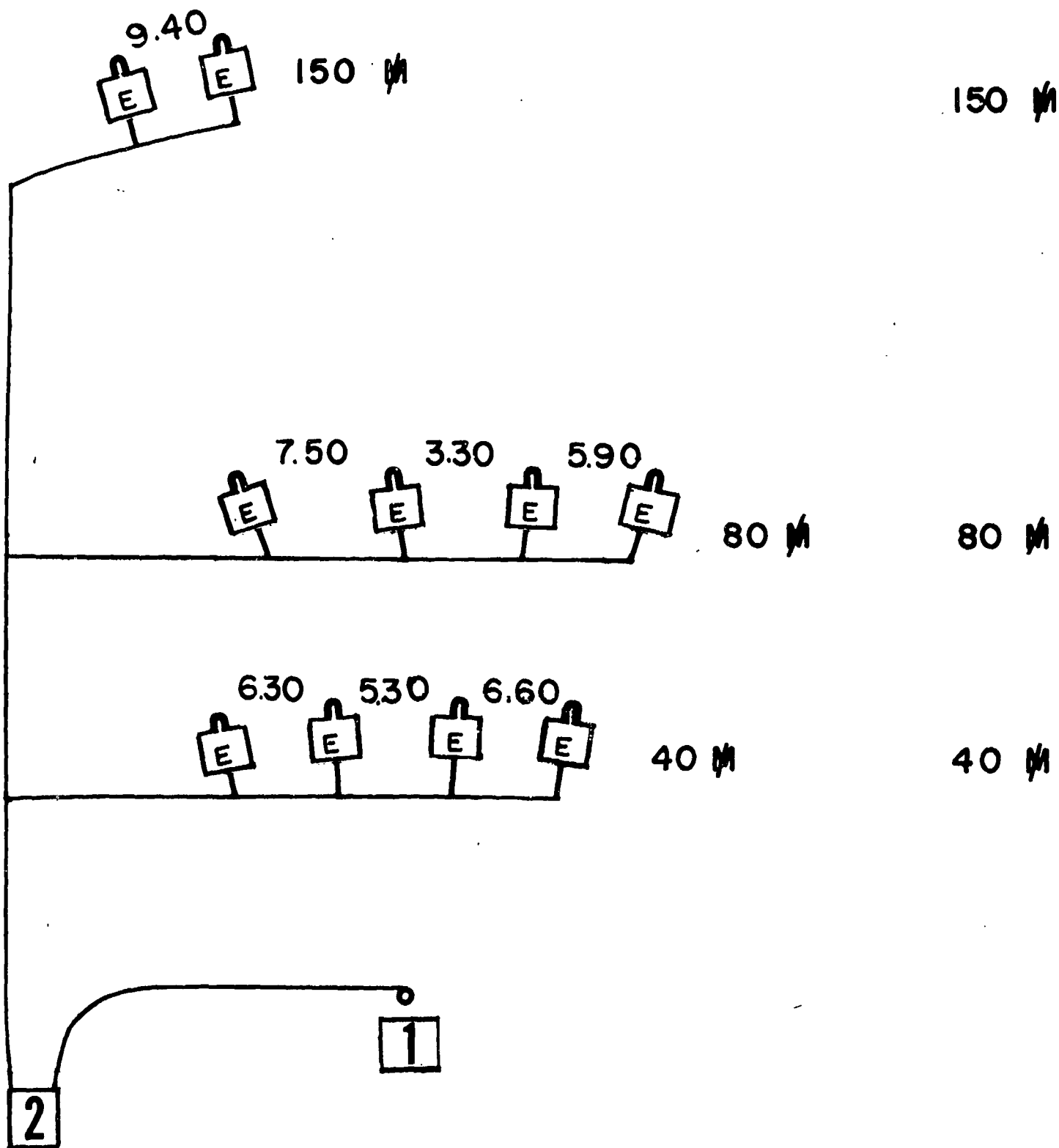


Figure 9

#### POINTED FIRE ACCURACY

- 1 - Firing position.
- 2 - Instrumentation trailer.
- E - "E" type target.
- M - Meters.
- O - Microphone.

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# CONFIDENTIAL

USATECOM Project No 8-5-0400-04

Service Test of Small Arms Weapons System (SAWS) (U)

## MANUFACTURERS' CODE SHEET

S-R - Cadillac Gage Corporation, Stoner 63 Rifle.

H-R - Harrington and Richardson, G-3 (Modified) Rifle.

A-R - Armalite, AR 18 Rifle.

S-C - Stoner 63 Carbine.

C-SMG - Colt Patented Firearms, Colt "Shortie" Carbine/Submachine Gun.

C-AR - Colt Automatic Rifle, CAR-15.

S-AR - Stoner 63 Automatic Rifle (magazine fed light machine gun).

Code S Machine Gun - Stoner 63 Machine Gun.

The SAWS candidate weapons were furnished by the above named contractors. Reference to each type weapon will be made throughout this report using the code names listed opposite the contractor. This code sheet will be removed from the report when loaned or otherwise distributed outside the Department of Defense.

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